SMITH CORONA

PUBLICATION BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

PUBLICATION:
5D Series PWP
Service Manual, Form 3-0774

SUBJECT: **New & Revised Pages for Service Manual, Form 3-0774**

DATE: November 13, 1989

Revision B Electronics

Enclosed are new and revised pages for 5D Series Service Manual, Form 3-0774. Insert these pages in the Manual according to the placement instructions below.

Placement Instructions

Remove and Discard (if applicable)		Insert		
Page Number	Date	Page Number	Revision Date	Reason for Change or Addition: *Added Revision B Electronics*
Contents	Original	Contents	11/89	Added Section 8 Diagrams
---	---	8A-1	Original	Diagrams
---	---	8B-1	Original	Wire routing -- Left side
---	---	8B-2	Original	Wire routing -- Right side
---	---	8B-3	Original	Wire routing -- Control PC Board
---	---	8B-4	Original	Wire routing -- Carrier
---	---	8C-1	Original	Waveforms
---	---	8C-2	Original	Waveforms
---	---	8D-1	Original	Wiring Diagram
---	---	8E-1	Original	Component Diagram
---	---	8E-2	Original	Component Diagram
---	---	8F-1	Original	Schematic -- Power Supply, Drivers
---	---	8F-2	Original	Schematic -- Logic, RAM, ROM

NOTE: An arrow [——→] indicates what has changed.

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3-0774A

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SERVICE BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

NO: 8

PRODUCT:
5D Series
Personal Word Processors

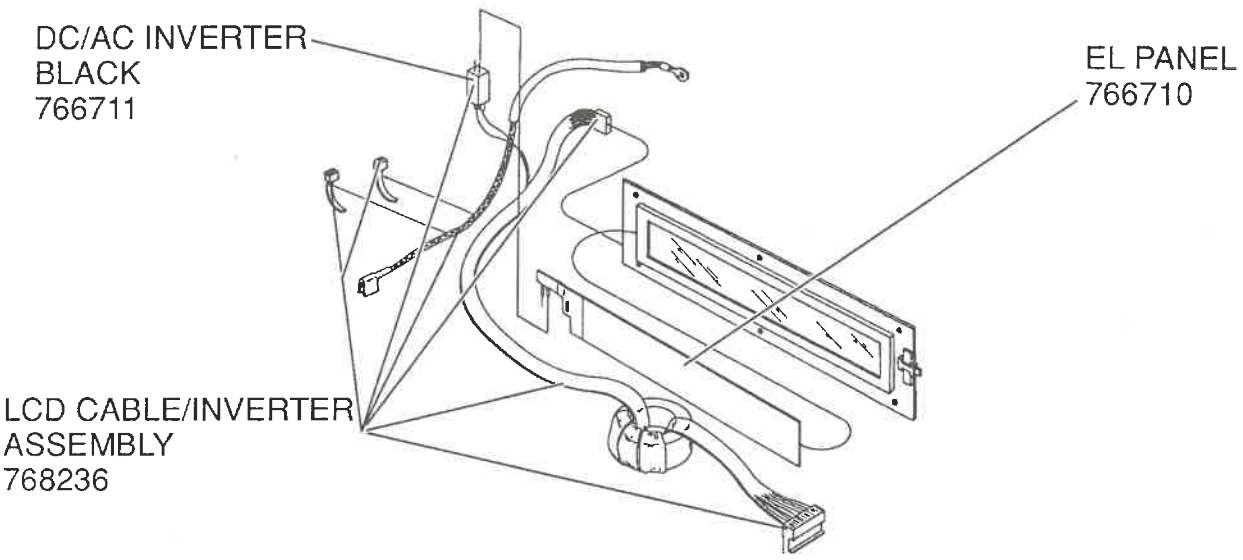
SUBJECT: **5D Series EL Panel (766710) and Inverter (766711) Change**

DATE: November 13, 1989

Due to availability, alternate vendors are supplying EL Panel (766710) and DC/AC Inverter (766711) for PWP 2000, PWP 3, Mark X PWP, Deville PWP 3, PWP X15, and PWP 55D. Since the new DC/AC Inverter has a 140 VAC output as opposed to the 120 VAC output of the previous design Inverter (761092), the redesigned parts **cannot** be individually installed in place of previous design parts.

Identification:

- EL Panel: See part number label on the EL Panel. P/N 761051 must be used with 120 VAC Inverter; P/N 766710 must be used with 140 VAC Inverter.
- 766711 -- **Black** -- Redesigned DC/AC Inverter has a **140 VAC output.**
- 761092 -- **Green** -- Previous design Inverter has a **120 VAC output.**



Part Number	Description
766710	EL Panel, For 140 VAC Inverter
766711	DC/AC Inverter, Black, 140 VAC Output
768236	LCD Cable/Inverter Assembly, 140 VAC Output

Previous design EL Panel (761051) and DC/AC Inverter (761092) will remain available from Service Stores.

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

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SERVICE BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

NO: 9

PRODUCT:
5D Series
Personal Word Processors

SUBJECT: **Revision B Electronics**

DATE: November 13, 1989

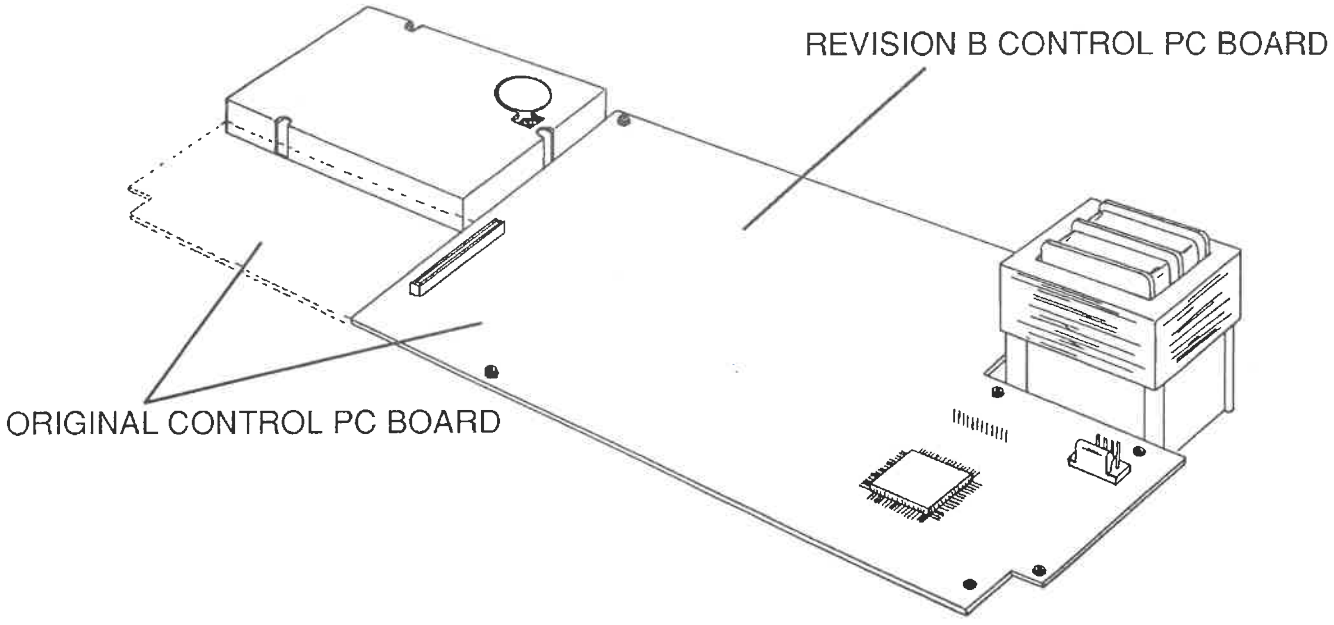
Current production of the 5D Series Personal Word Processors include a new Control PC Board and different connecting wires. The new Control PC Board is smaller than the original and is referred to as Revision B Electronics.

Interchangeability: The Revision B Control PC Board is not interchangeable with the original board because of connecting wire lengths, and has a new series of Part Numbers (see parts information on reverse side of this Bulletin).

LCD Cable: The new LCD Cable implemented with this change utilizes high flex flat ribbon cable instead of discreet wires.

Manual Updates: Two Publication Bulletins (3-0774A & 3-0775A) are being released with this Bulletin to add pages covering Revision B Electronics to the original Service Manual (3-0774) and Parts Manual (3-0775). **Be sure to update your Manual.**

Identification: On the Revision B Control PC Board, the left side is perpendicular to the front edge of the PC Board. It does not extend in front of the Disk Drive as the original Board.



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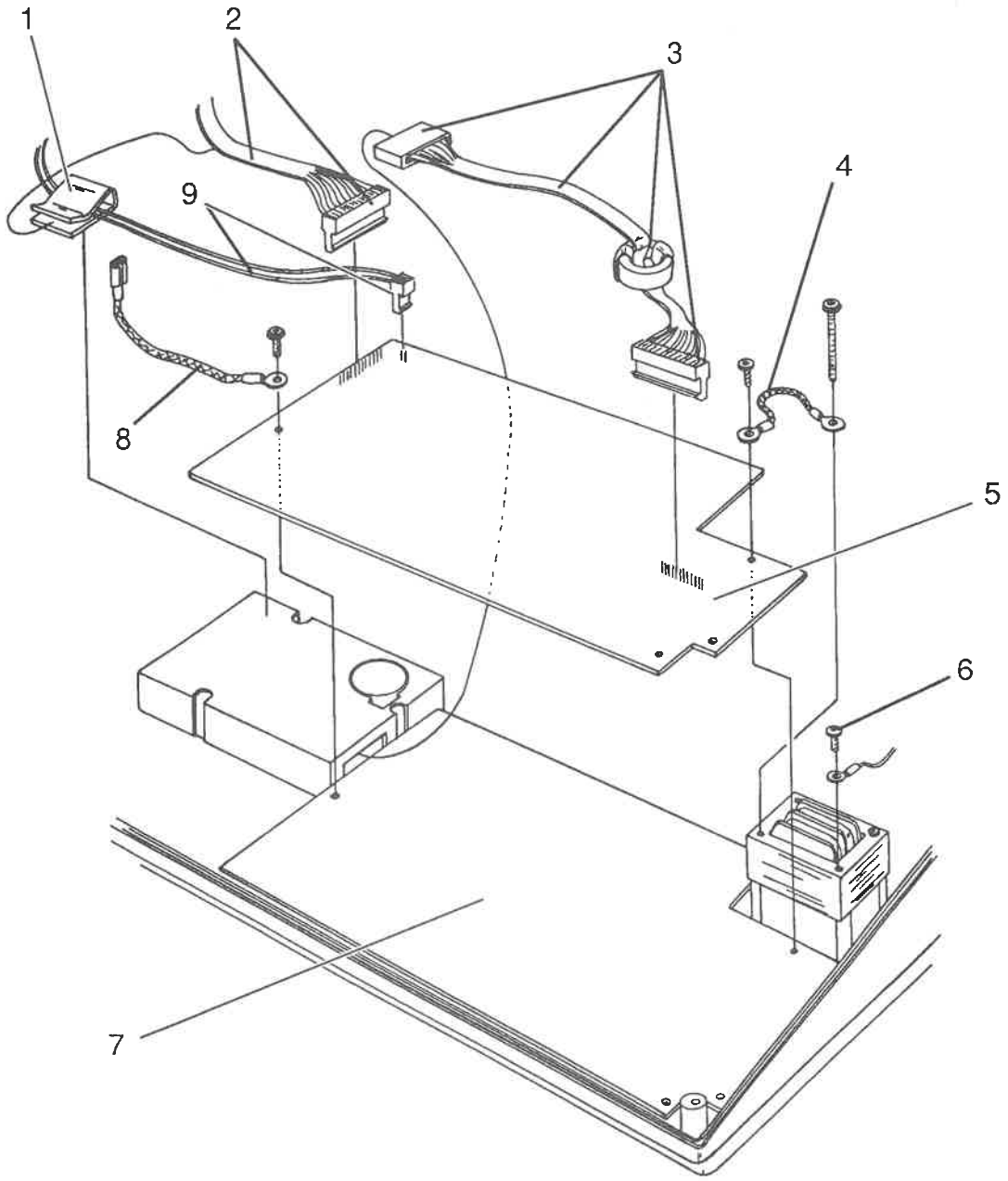

Parts Information

Ref	Part Number	Part Name
1	765239	Cable Clamp
2	768234	LCD Cable/Inverter Assembly
3	768503	Disk Drive Cable Assembly
4	760927	Braided Ground Cable
5	768880	Control PC Board, USA & Canada
5	768882	Control PC Board, French/Canadian
5	768884	Control PC Board, Spanish/American
5	768885	Control PC Board, United Kingdom
6	781910	Self Tap Screw
7	768235	Base Shield
8	760926	Keyboard Ground Cable
9	768672	Left End Switch Assembly

SMITH CORONA

PUBLICATION BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

PUBLICATION:
5D Series PWP
Parts Manual, Form 3-0775

SUBJECT: **New Pages for Parts Manual, Form 3-0775**

DATE: November 13, 1989

RE: Addition of Revision B Electronic Information

Enclosed are new pages for 5D Series Parts Manual, Form 3-0775. Insert these pages in the Manual according to the placement instructions below.

Placement Instructions

Remove and Discard (if applicable)		Insert		
Page Number	**Date**	**Page Number**	**Revision Date**	**Reason for Addition:** ***Added Revision B Electronics***
---	---	14A	Original	Control PC Board, Ground Shield, Cables
---	---	14B	Original	Control PC Board Components
---	---	14C	Original	Control PC Board Components
---	---	14D	Original	Control PC Board Components
---	---	14E	Original	Control PC Board Components

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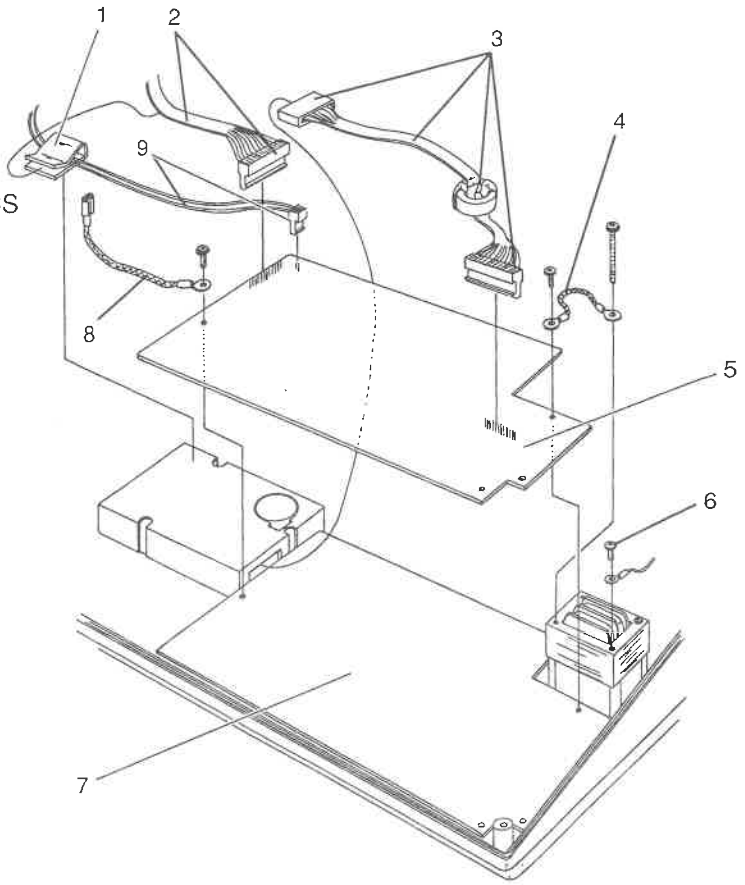
CONTROL PC BOARD
GROUND SHIELD
CABLES

REVISION B ELECTRONICS

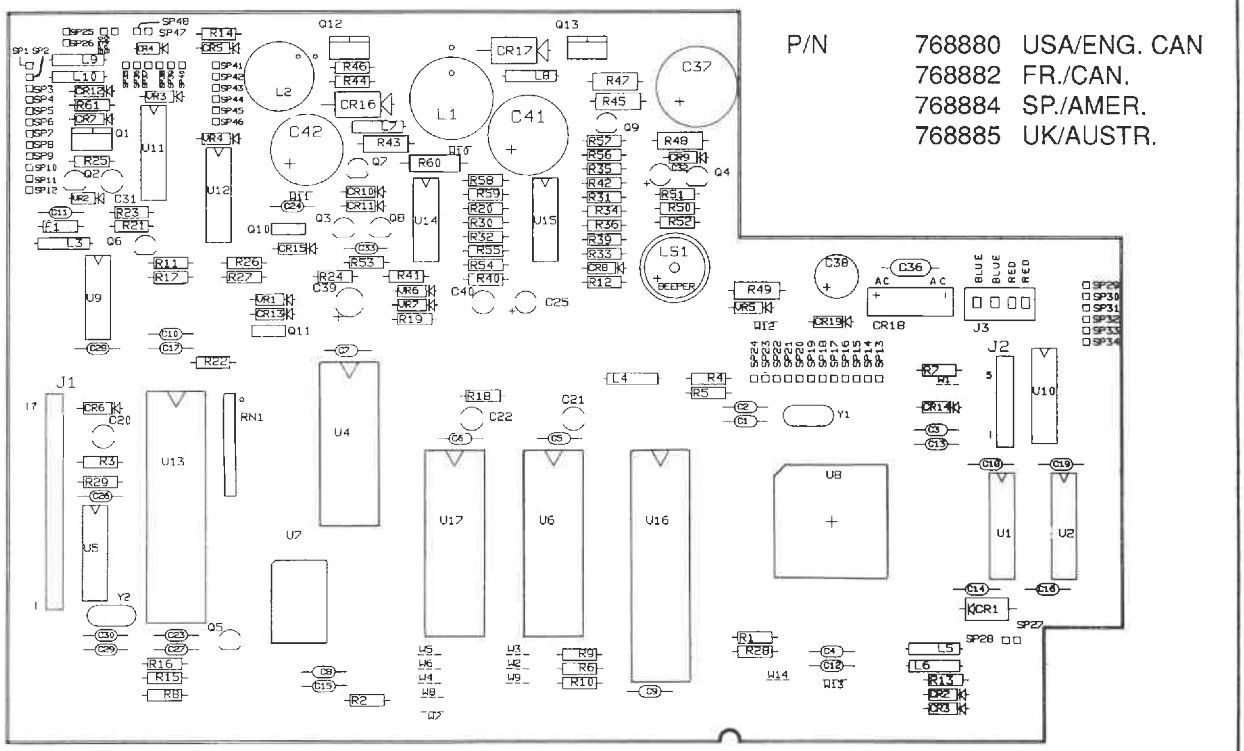


REF	PART NUMBER	PART NAME	QTY
1	765239	Cable Clamp	1
2	768234	LCD Cable/Inverter Assembly	1
3	768503	Disk Drive Cable Assembly	1
4	760927	Braided Ground Cable	1
5	768880	Control PC Board, Revision B, USA & Canada	1
		International Revision B Control PC Boards	
5	768882	Control PC Board, Revision B 5DEB, 5DCB, French/Canadian	1
5	768884	Control PC Board, Revision B 5DEB, Spanish/American	1
5	768885	Control PC Board, Revision B 5DEB, United Kingdom & Australia	1
6	781910	Self Tap Screw	1
7	768235	Base Shield	1
8	760926	Keyboard Ground Cable	1
9	768672	Left End Switch Assembly	1

CONTROL PC BOARD COMPONENTS
REVISION B ELECTRONICS

MODELS 5DEB, 5DCB, 5DWA
5DKA, 5DDA, 5DSA

P/N
768880 USA/ENG. CAN
768882 FR./CAN.
768884 SP./AMER.
768885 UK/AUSTR.

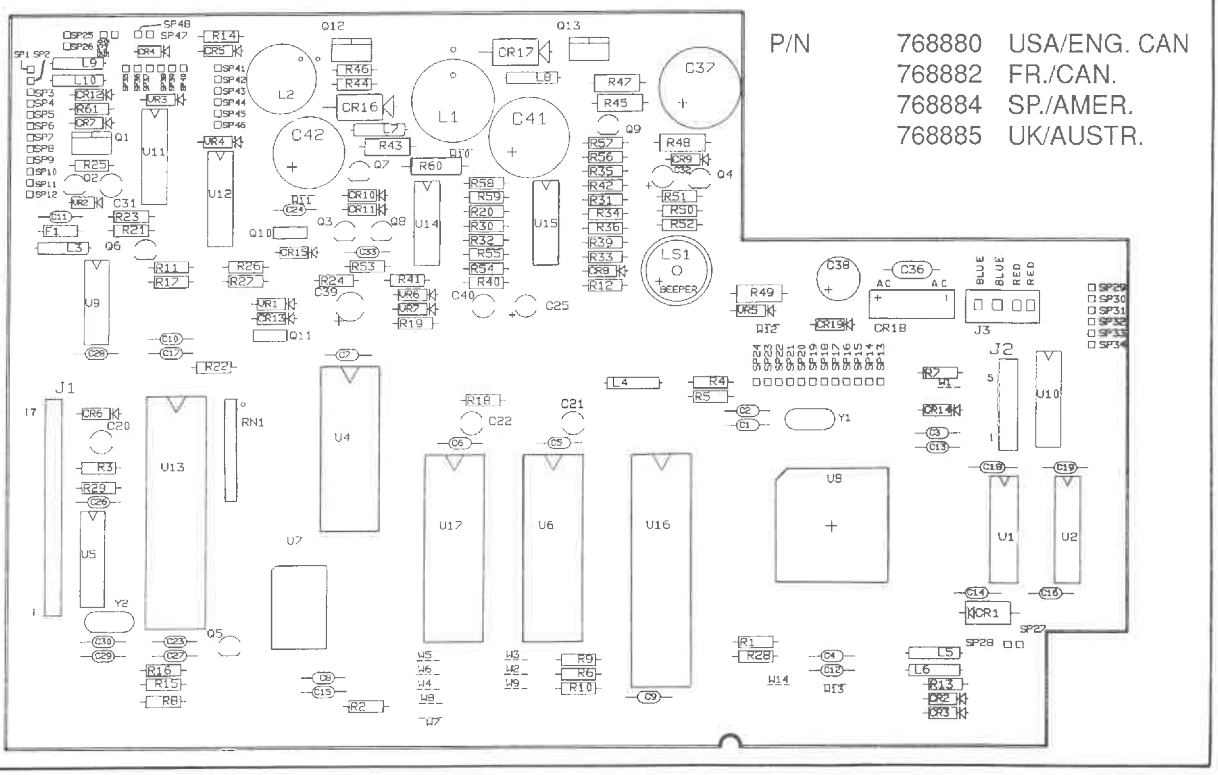


COMPONENT	PART NUMBER	DESCRIPTION
C1, C2	700353	Capacitor, Axial Ceramic, 10pF, 100V
C3-C10	741566	Capacitor, Axial Ceramic, .1µF, 50V
C11-C17	700359	Capacitor, Axial Ceramic, .01µF, 100V
C18, C19	741570	Capacitor, Axial Ceramic, .33µF, 50V
C20-C22	770207	Capacitor, Radial Electric, 10µF, 16V
C23, C24, C28	741565	Capacitor, Axial Ceramic, .1µF, 50V
C25	736112	Capacitor, Radial Electric, 1µF, 50V
C26, C27	700341	Capacitor, Axial Ceramic, .01µF, 50V
C29, C30	700365	Capacitor, Axial Ceramic, 30pF, 100V
C31	736102	Capacitor, Radial Electric, 10µ, 25V
C32	730011	Capacitor, Radial Electric, 1µF, 6.3V
C33	700367	Capacitor, Axial Ceramic, 100pF, 50V
C36	741573	Capacitor, Axial Ceramic, .1µF, 100V
C37	770218	Capacitor, Radial Electric, 2200µF, 50V
C38	730030	Capacitor, Radial Electric, 470µF, 35V
C39	736114	Capacitor, Radial Electric, 100µF, 6.3V
C40	736115	Capacitor, Radial Electric, 33µF, 25V
C41	730022	Capacitor, Radial Electric, 3300µF, 25V
C42	730029	Capacitor, Radial Electric, 4700µF, 10V
CR1	760491	Diode, Transorb, 6.8V, P6KE6, .8A
CR2-CR11	709100	Diode, Silicon Switch, 1N914
CR12, CR13	722058	Diode, Fast, 1A, 1N4933
CR14, CR15	700521	Diode, Rectifier, 50V, 1N4001
CR16, CR17	782491	Diode, Fast Recovery, CRBYW98
CR18	734802	Diode, Bridge Rectifier, 100V, 4A
CR19	746184	Diode, Rectifier, 100V, 1N4002
F1	766354	Pico Fuse, 1A
J1	770150	Connector, Flex Cable, .100 Centers, 17 Position
J2	770151	Connector, Flex Cable, .100 Centers, 6 Position
J3	723358	Header, Locking, 156 Centers, 4 Position
L1	781560	Inductor, 4 Pin, 270µF, 6 Amp
L2	760416	Inductor, 50µF, H, 3.3 Amp
L3-L10	766462	Ferrite Bead on Lead
LS1 (Beeper)	728783	Transducer, Audio, 12V

CONTROL PC BOARD COMPONENTS
REVISION B ELECTRONICS

MODELS 5DEB, 5DCB, 5DWA
5DKA, 5DDA, 5DSA

P/N		
	768880	USA/ENG. CAN
	768882	FR./CAN.
	768884	SP./AMER.
	768885	UK/AUSTR.

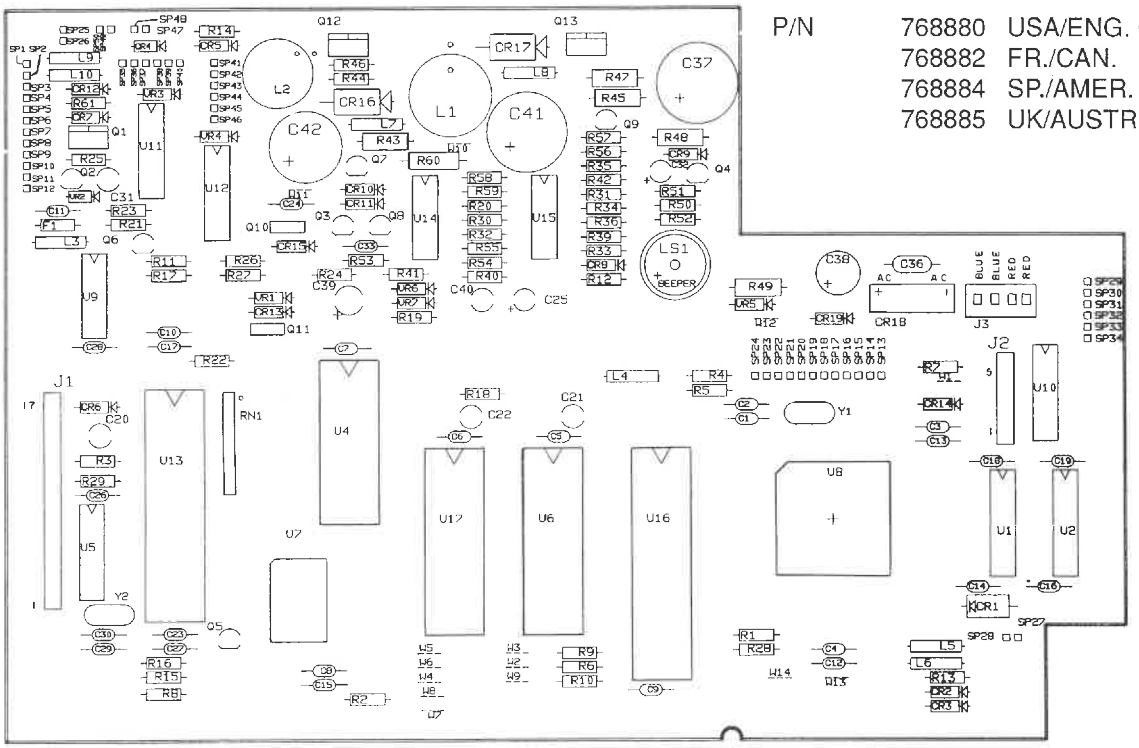


COMPONENT	PART NUMBER	DESCRIPTION
Q1	770302	Transistor, Darlington, NPN, 2N6045
Q2-Q4	703714	Transistor, PNP, 2N3906
Q5-Q9	702518	Transistor, NPN, 2N3904
Q10	740344	Transistor, PNP, 2N6035
Q11	743086	Transistor, NPN, 2N6039
Q12, Q13	760812	Transistor, Mosfet, P-Channel, 50V, IRF9Z20
R1-R3	748225	Resistor, 11Ω, 1/4W, 5%
R4, R44	701286	Resistor, 820Ω, 1/4W, 5%
R5	701259	Resistor, 1MΩ, 1/4W, 5%
R6, R8	701279	Resistor, 3KΩ, 1/4W, 5%
R11	701252	Resistor, 220Ω, 1/4W, 5%
R12, R46	746938	Resistor, 390Ω, 1/4W, 5%
R13-R20	701272	Resistor, 3.9KΩ, 1/4W, 5%
R21, R22	749348	Resistor, 180Ω, 1/4W, 5%
R23, R24	701268	Resistor, 10KΩ, 1/4W, 5%
R25	701267	Resistor, 2.7KΩ, 1/4W, 5%
R26, R27	701280	Resistor, 1.8KΩ, 1/4W, 5%
R28	701289	Resistor, 510Ω, 1/4W, 5%
R29-R31	701299	Resistor, 8.2KΩ, 1/4W, 5%
R32-R34	746190	Resistor, 1 Meg, 1/4W, 1%
R35	701271	Resistor, 470Ω, 1/4W, 5%
R36	748270	Resistor, 100KΩ, 1/4W, 1%
R39	701255	Resistor, 2KΩ, 1/4W, 5%
R40-R42	701254	Resistor, 1KΩ, 1/4W, 5%
R43, R45	703734	Resistor, 820Ω, 1/2W, 5%
R47	703733	Resistor, 390Ω,1/2W, 5%
R48	703730	Resistor, 3.9KΩ, 1/2W, 5%
R49	703722	Resistor, 1KΩ, 1/2W, 5%
R50	701275	Resistor, 22KΩ, 1/4W, 5%
R51	701297	Resistor, 5.6KΩ, 1/4W, 5%
R52	701266	Resistor, 100Ω, 1/4W, 5%
R53	701256	Resistor, 18KΩ, 1/4W, 5%
R54, R55	701263	Resistor, 100KΩ, 1/4W, 5%
R56	746192	Resistor, 4.7KΩ, 1/4W, 1%

CONTROL PC BOARD COMPONENTS
REVISION B ELECTRONICS

MODELS 5DEB, 5DCB, 5DWA
5DKA, 5DDA, 5DSA

P/N
768880 USA/ENG. CAN
768882 FR./CAN.
768884 SP./AMER.
768885 UK/AUSTR.

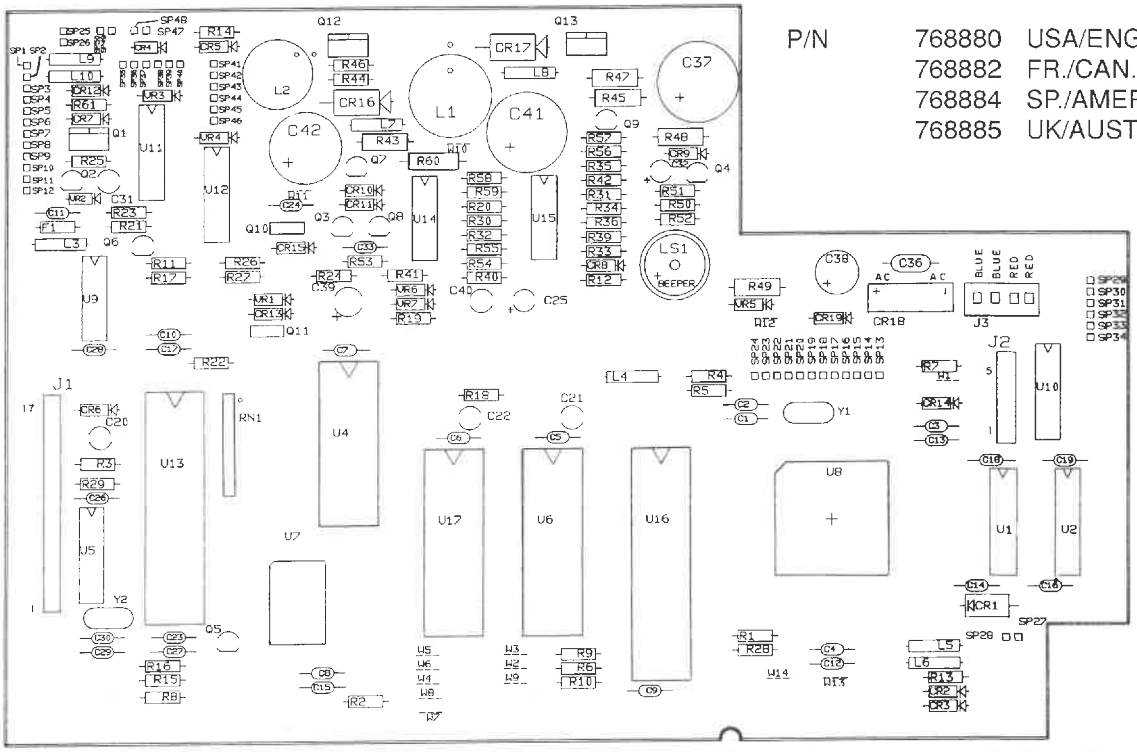


COMPONENT	PART NUMBER	DESCRIPTION
R57	746191	Resistor, 12KΩ, 1/4W, 1%
R58	748245	Resistor, 39Ω, 1/4W, 5%
R59	748279	Resistor, 10KΩ, 1/4W, 1%
R60	773130	Resistor, .1Ω, 1W, 5%
R61	781720	Resistor, 11Ω, 1/4W, 5%, Wire Wound
RN1	752156	Resistor Network, 22KΩ, 9 Position
SP1-SP50	748858	Stake Pin, Connector
U1, U2	760511	IC, 64K x 4 Bit Dram, 4464
U4	781912	IC, CMOS, 8K x 8 Bit S-RAM, 6264
U5	760754	IC, TTL, Dual Decoder-Demux, 74LS156
U6	786238	IC, Rom, 1 Meg, USA & Canada
U7	761069	IC, LCD Controller, 64 Pin ASIC
U8	761060	IC, ASIC, PWP, 84 Pin, PLCC
U9	724700	IC, TTL Hex Buffer, Inverting, Open Collector
U10-U12	781722	IC, Quad Driver, L6220
U13	786315	IC, Microprocessor, Slave, 8053
U14	701451	IC, Quad Comparator, LM339
U15	766377	IC, Dual D Flip-Flop, 74HC74
U16	760486	IC, Microprocessor, Master, Z80B
U17	750718	IC, Dictionary, 2 Meg (Programmed) USA & Canada
VR1	781740	Diode Zener, 5.1V, 1.5W, 1N5918
VR2	760817	Diode, Zener, 4.3V, .5W, 1N5991
VR3	765829	Diode, Zener, 2.4V, .5W, 1N5221
VR4	780280	Diode, Zener, 5V, 1W, 1N4733
VR5	760792	Diode, Zener, 13V, .4W, 1N5739
VR6	766378	Diode, Zener, 5V, 1/2W, 1N5993
VR7	724682	Diode, Zener, 24V, 1/2W, 1N5252
W10-W12	705294	Jumper Wire
Y1	761067	Crystal, Resonant, 16.25 MHz
Y2	736950	Resonator, Ceramic, 12MHz

CONTROL PC BOARD COMPONENTS
REVISION B ELECTRONICS

MODELS 5DEB, 5DCB, 5DWA
5DKA, 5DDA, 5DSA

P/N		
	768880	USA/ENG. CAN
	768882	FR./CAN.
	768884	SP./AMER.
	768885	UK/AUSTR.



COMPONENT	PART NUMBER	DESCRIPTION
International Components Only		
U6	786239	IC, Rom, 1 Meg, French/Canadian
U6	750992	IC, Rom, 1 Meg, Spanish/American
U6	750993	IC, Rom, 1 Meg, UK & Australia
U17	750667	IC, Dictionary, 2 meg (Programmed) French/Canadian
U17	750719	IC, Dictionary, 2 Meg (Programmed) Spanish/American
U17	786051	IC, Dictionary, 2 Meg (Programmed) UK & Australia

SMITH CORONA

PUBLICATION BULLET

TO: Technical Service & Training
Regional Service Managers
Service Locations
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PUBLICATION:
5D SERIES
WORD PROCESSORS
PARTS MANUAL, FORM 3-076

SUBJECT: **REVISED PAGES FOR PARTS MANUAL, FORM 3-0763**

DATE: November 30, 1988

Enclosed are revised pages for the Smith Corona 5D Personal Word Processors Parts Manual, Form 3-0763. Insert these pages in the Manual according to the placement instructions below.

PLACEMENT INSTRUCTIONS

REMOVE AND DISCARD		INSERT		
PAGE NO.	DATE	PAGE NO.	REVISION DATE	REASON FOR CHANGE
2	ORIGINAL	2	11/88	Added part numbers of tutorial disks
3	ORIGINAL	3	11/88	Corrected part number of EL Panel. Changed part number of LCD Cable/Inverter assembly
13	ORIGINAL	13	11/88	Changed part number of ground cable

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ELEMENT DRIVE	8
RIBBON DRIVE	9
CASSETTE AND CORRECTION RIBBON	10
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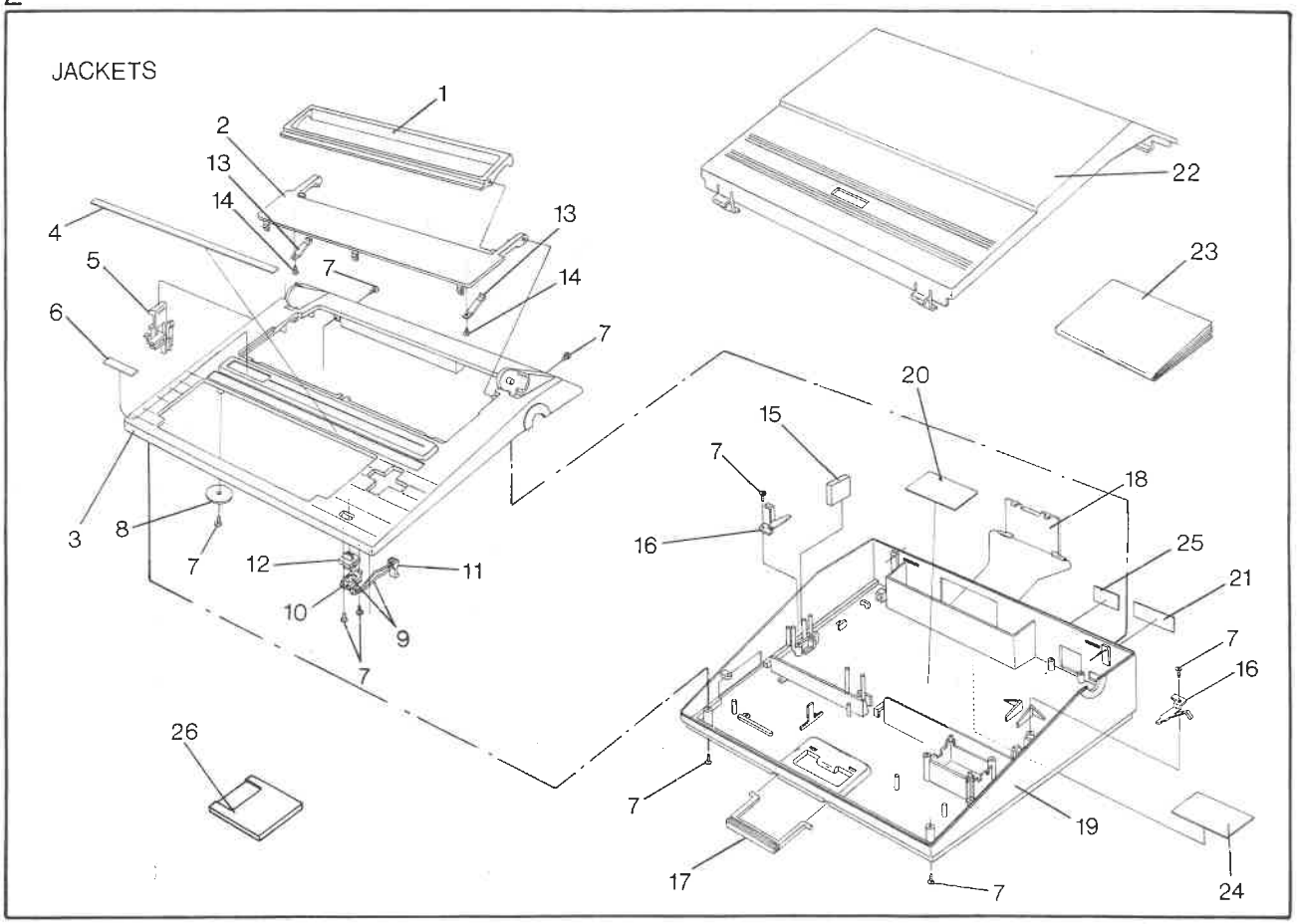
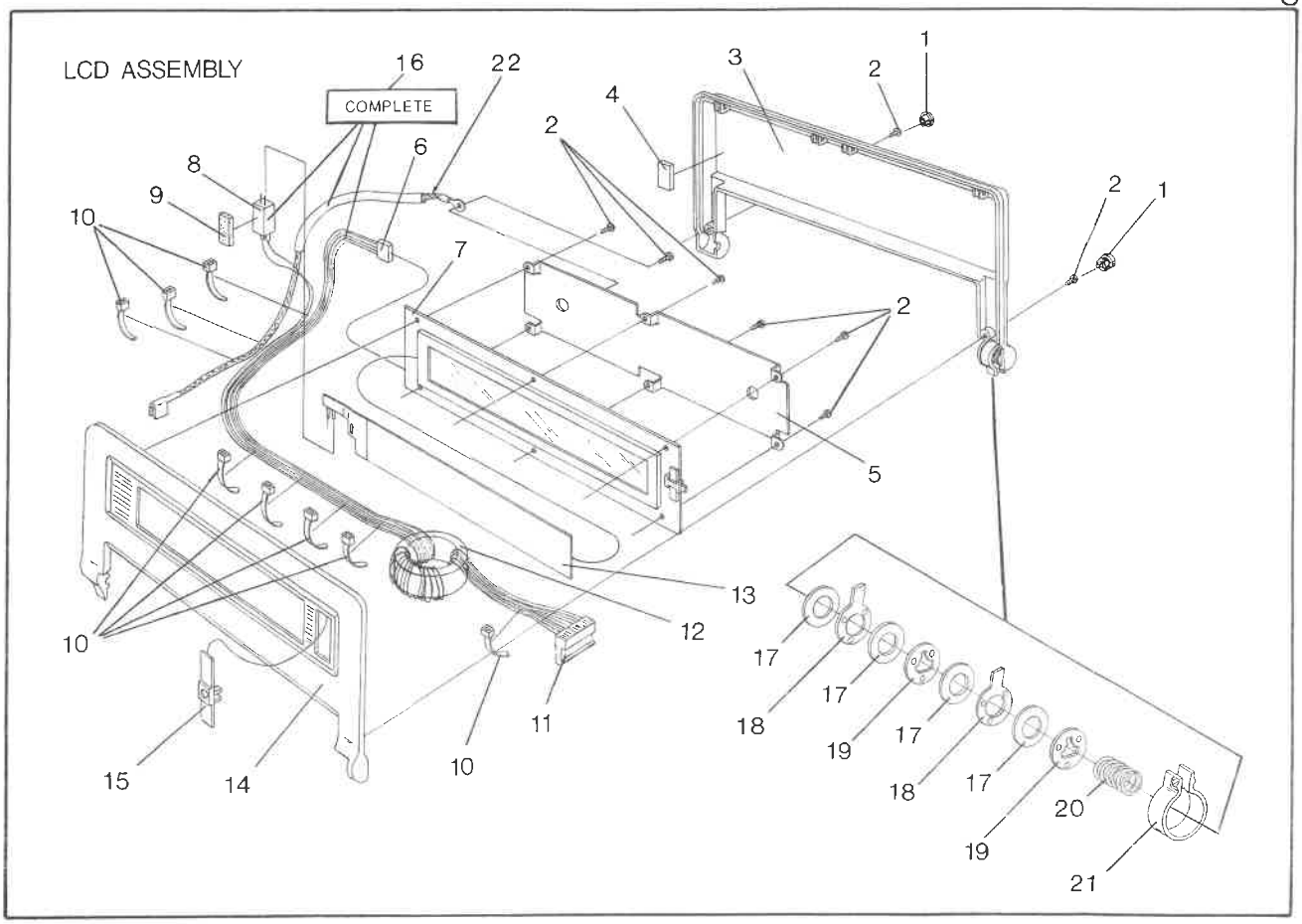
2



REF	PART NUMBER	PART NAME	QTY
1	768320	Paper Bail, Black	1
1	768321	Paper Bail, Platinum	1
2	768050	Deck, Gray	1
2	768051	Deck, Platinum	1
3	768170	Mask, Platinum (PWP 40) (W/Ref 6)	1
3	768171	Mask, Gray (PWP 3) (W/Ref 6)	1
4	768160	Overlay (PWP 40)	1
4	768161	Overlay (PWP 3)	1
5	768130	Paper Release Slider, Platinum	1
5	768131	Paper Release Slider, Gray	1
6	729572	Nameplate	1
7	747258	Screw	9
8	768300	Washer	1
9	765891	Mode Switch Assembly, (W/Ref 10 & 11)	1
10	768107	Mode Switch	1
11	736900	Connector, 2 Position	1
12	765131	Mode Switch Cap	1
13	773142	Paper Bail Detent	2
14	770672	Screw	2
15	781890	Casing Base Foam	1
16	770829	Foot Retainer	2
17	768150	Carrying Case Handle, Gray	1
17	768151	Carrying Case Handle, Platinum	1
18	765160	Cord Storage Door, Platinum	1
18	765161	Cord Storage Door, Gray	1
19	768020	Casing Base, Gray	1
19	768021	Casing Base, Platinum	1
20	772700	Warning Label	1
21	768109	Fuse Rating Label	1
22	768090	Carrying Case Lid, Gray	1
22	768091	Carrying Case Lid, Platinum	1

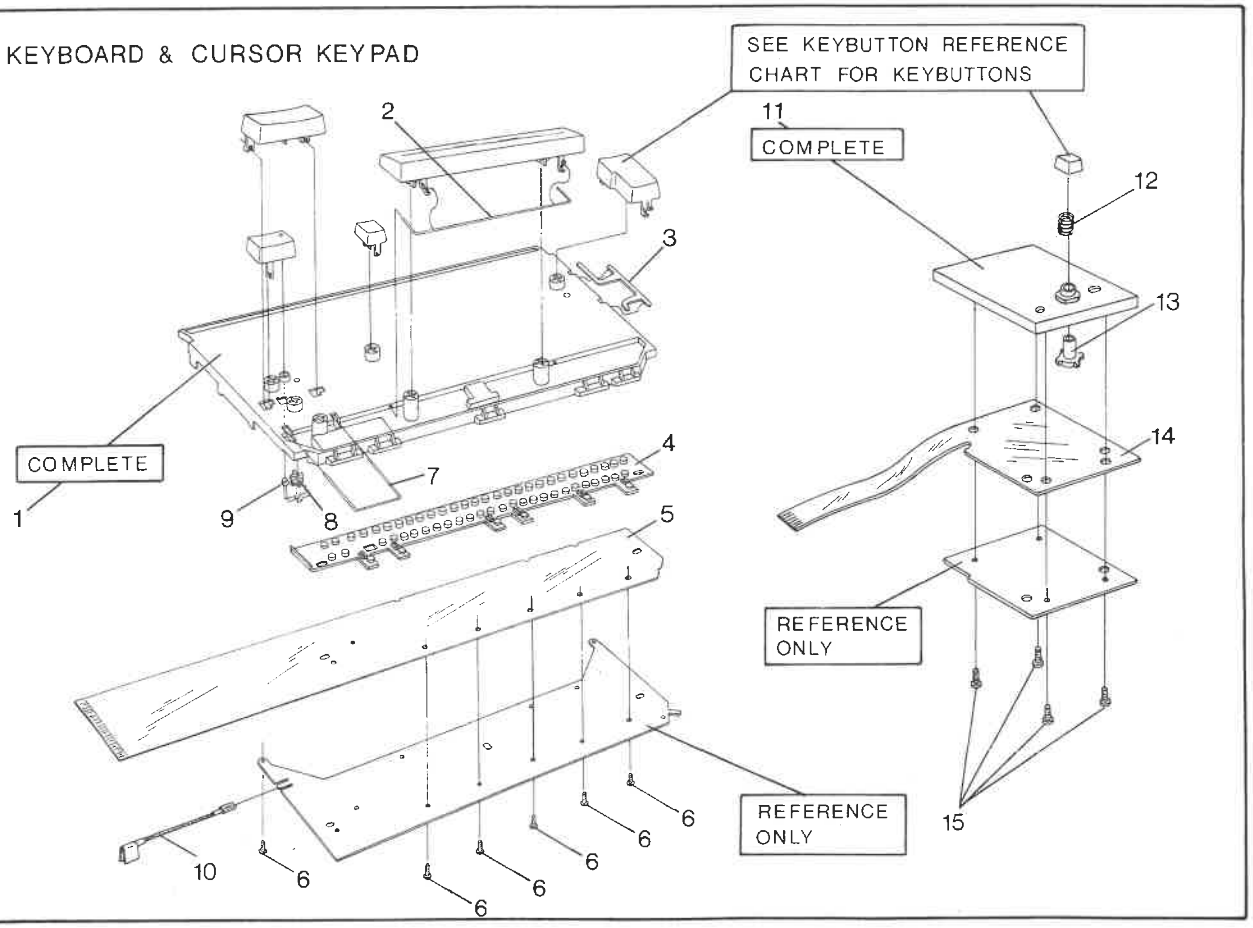
REF	PART NUMBER	PART NAME	QTY
		OWNER'S MANUALS & TUTORIAL DISKS	
23	781996	Owner's Manual USA & Canada, UK, Australia, French Canadian, Spanish American	1
23	781997	Owner's Manual, French Canadian	1
23	781998	Owner's Manual, Spanish American	1
26	768318	Tutorial Data Disk, PWP 40, USA & Canada	1
26	768317	Tutorial Data Disk, PWP 3 USA & Canada	1
26	768680	Tutorial Data Disk, PWP 40 French Canadian	1
26	768681	Tutorial Data Disk, PWP 3 French Canadian	1
26	768682	Tutorial Data Disk, PWP 40 UK, Australia	1
26	768683	Tutorial Data Disk, PWP 40 Spanish American	1
		INTERNATIONAL JACKETING PARTS	
19	768020	Casing Base, Gray, French Canadian	1
19	768021	Casing Base, Platinum, French Canadian, Spanish American	1
19	768022	Casing Base, Platinum, UK	1
20	772700	Warning Label, UK, Australia	1
20	772703	Warning Label, French Canadian, Spanish American	1
24	770759	Electric Rating Label, UK	1
25	771425	Country of Origin Label, UK	1



REF	PART NUMBER	PART NAME	QTY
1	765110	Hole Cover, Platinum	1
1	765111	Hole Cover, Gray	1
2	770672	Screw	8
3	768070	Upper LCD Housing, Gray	1
3	768071	Upper LCD Housing, Platinum	1
4	781373	Foam	1
5	768105	LCD Ground Shield	1
6	760804	Connector, 10 Pin	1
7	761050	LCD	1
8	761092	DC/AC Inverter	1
9	768640	Foam	1
10	700523	Cable Tie	8
11	751064	Connector, 12 Pin	1
12	760883	Toroid	1
13	761051	EL Panel	1
14	768060	Lower LCD Housing, Gray	1
14	768061	Lower LCD Housing, Platinum	1
15	768190	LCD Switch Slide, Gray	1
15	768191	LCD Switch Slide, Platinum	1
16	768232	LCD Cable/Inverter Assembly, (W/Ref 6, 8-11, 22)	1
17	768309	Friction Brake Pad	4
18	768004	Friction Plate	2
19	768305	Friction Disc	2
20	768007	Brake Spring	1
21	768142	Slip Ring, Gray	1
21	768143	Slip Ring, Platinum	1
22	760910	Ground Cable	1

4

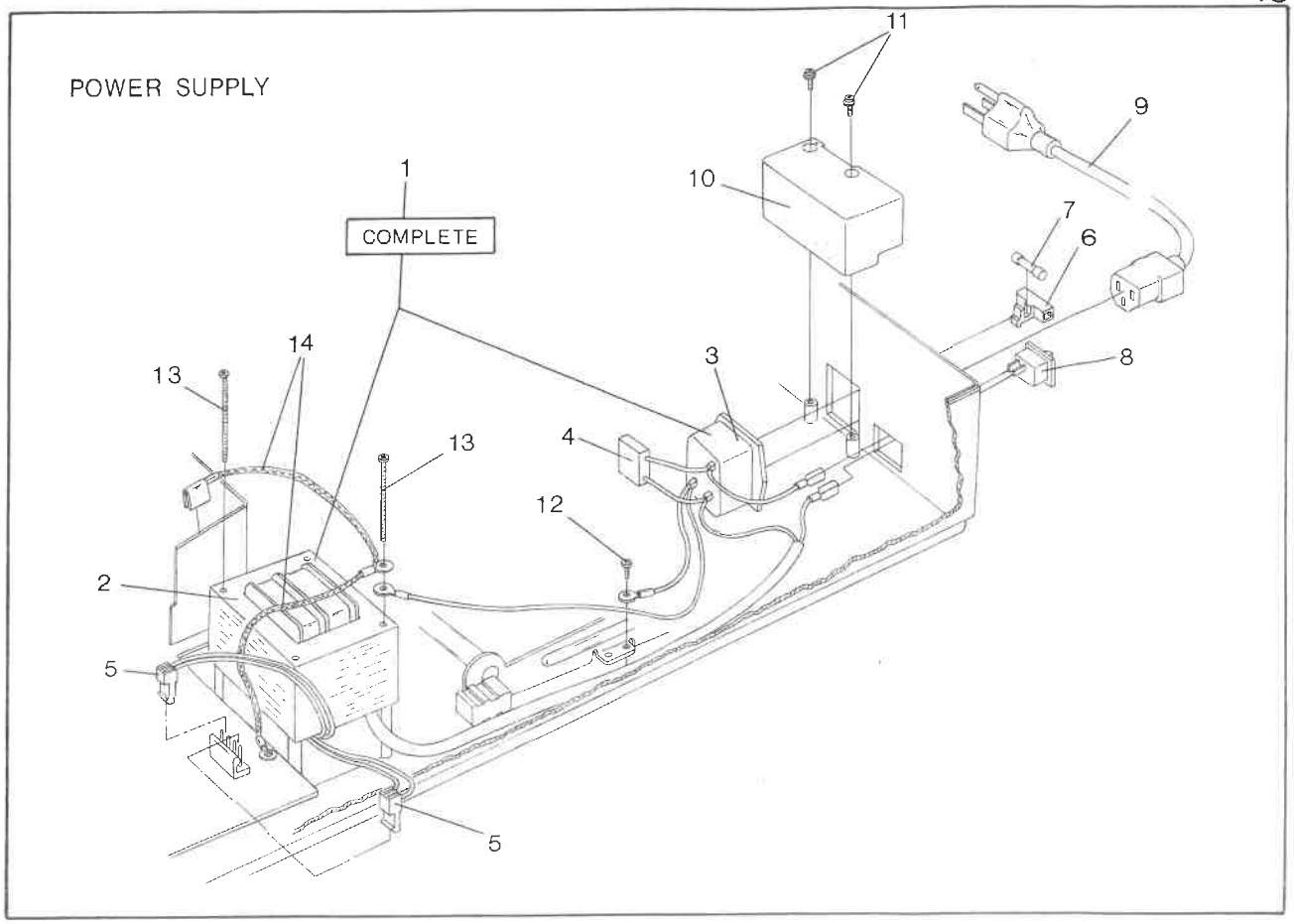
KEYBOARD & CURSOR KEYPAD



REF	PART NUMBER	PART NAME	QTY
1	778361	Keyboard Complete, Platinum, USA & Canada	1
2	778281	Spacebar Bail	1
3	778280	Return Bail	1
4	778340	Molded Switches	1
5	778349	Flexible Circuit	1
6	780424	Screw	12
7	778282	Left Shift Bail	1
8	778347	LED Contact Washer	1
9	778316	LED	1
10	760908	Ground Cable Assembly	1
11	765000	Cursor Keypad Complete	1
12	742968	Keybutton Spring	5
13	742970	Keyswitch Plunger	5
14	758456	Cursor Keypad Mylar PC Board	1
15	742978	Screw	4

KEYBOARDS FOR INTERNATIONAL MODELS ONLY

1	778364	Keyboard Complete, Platinum, French Canadian	1
1	778365	Keyboard Complete, Platinum, Spanish American	1
1	778366	Keyboard Complete, Platinum, UK	1



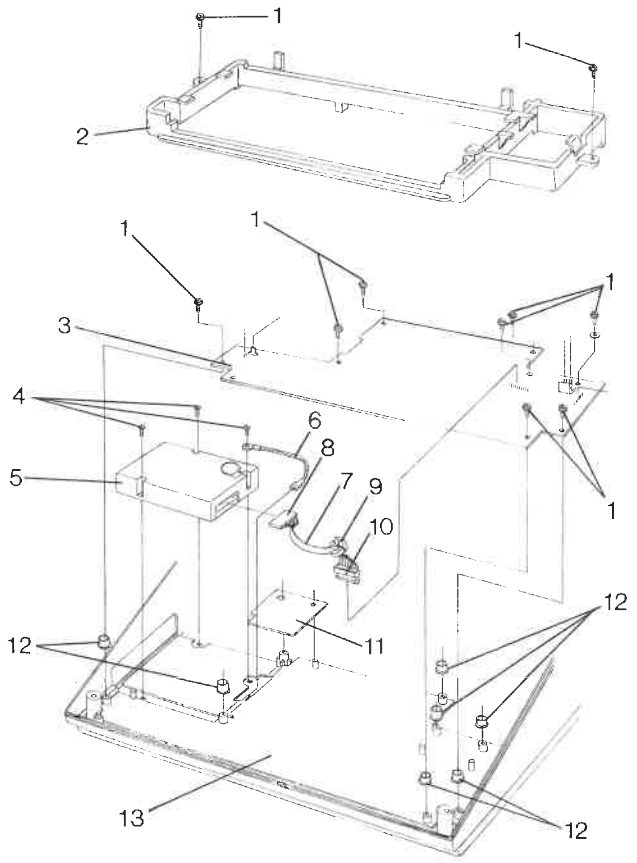
REF	PART NUMBER	PART NAME	QTY
1	768240	AC Power Assembly, (120 V/60 Hz) (W/Ref 2-5)	1
2	768250	Transformer (120 V/60 Hz)	1
3	746035	Appliance Coupler	1
4	746100	Capacitor, 1 uF, 250 VAC	1
5	723356	Connector, 2 Pin	2
6	782215	Fuse Holder	1
7	740437	Fuse (.75 Amp, Slo-Blo, 250V)	1
8	718180	Switch	1
9	525778	Power Cord	1
10	768102	Power Supply Cover	1
11	747258	Screw	2
12	781557	Screw	1
13	782219	Screw	2
14	782414	Braided Ground Cable	1

INTERNATIONAL POWER SUPPLY PARTS

REF	PART NUMBER	PART NAME	QTY
1	768241*	AC Power Assembly, (240 V/50 Hz) (W/Ref 2-5)	1
2	768251*	Transformer (240 V/50 Hz)	1
9	522551*	Power Cord, UK	1

* International AC Power Supplies, Power Cords, and Transformers available for sale only to International Distributors.

CONTROL PC BOARD,
DISK DRIVE,
KEYBOARD FRAME



REF	PART NUMBER	PART NAME	QTY
1	747258	Screw	10
2	768000	Keyboard Frame	1
3	768210	Control PC Board	1
4	765120	Screw	3
5	760768	Disk Drive	1
6	760909	Ground Cable	1
7	768303	Disk Drive Cable Assembly, (W/Ref 8-10)	1
8	760802	Connector, 12 Position	1
9	782289	Toroid	1
10	751064	Connector, 12 Position	1
11	768301	Insulator	1
12	768104	Standoff	7
13	768106	Casing Base Shield	1

INTERNATIONAL CONTROL PC BOARDS

REF	PART NUMBER	PART NAME	QTY
3	768212	Control PC Board, French Canadian	1
3	768214	Control PC Board, Spanish American	1
3	768215	Control PC Board, United Kingdom	1

SMITH CORONA

SERVICE BULLETIN INDEX

5D SERIES

BULLETIN NUMBER	ISSUE DATE	SUBJECT
1	8/15/88	Servicing 5D Series Personal Word Processors **REMARKS:** Introduces Service and parts information for PWP 3 (5DCA) and PWP 40 (5DEA).
2	9/30/88	Pico Fuse F1 **REMARKS:** Stronger 1/2 Amp Pico Fuse used in PC Board position F1 eliminates loss of power to EL Panel.
3	9/30/88	Redesigned LCD Cable **REMARKS:** Redesigned LCD Cable eliminates wire breakage which causes apparent LCD failure.

AN ARROW INDICATES CHANGES OR ADDITIONS

KEEP THIS INDEX IN THE SERVICE MANUAL BINDER

SMITH CORONA

SERVICE BULLETIN INDEX

5D SERIES

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3	9/30/88	Redesigned LCD Cable **Remarks:** Redesigned LCD Cable eliminates wire breakage which causes apparent LCD failure.
→ 4	1/16/89	Fiber Washer for Control PC Board **Remarks:** New Fiber Washer prevents accidentally shorting +5VDC to ground.
→ 5	1/16/89	Short Carrier Capstan Cable Assembly **Remarks:** Unique parts and service information.
→ 6	1/16/89	Carrier Rack Drive System **Remarks:** Unique parts and service information.
→ 7	5/15/89	Servicing New 5D Series Personal Word Processors **Remarks:** Introduces New 5D Models

- AND -

Applicable Electronic Miscellaneous Bulletins (See Electronic Miscellaneous Index)

AN ARROW INDICATES CHANGES OR ADDITIONS

KEEP THIS INDEX IN THE SERVICE MANUAL BINDER

May 1989

Printed in U.S.A.

SMITH CORONA

SERVICE BULLETI

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada and International
Electronic Servicing Dealers

NO: 1

PRODUCT:

5D SERIES
PERSONAL WORD PROCESSORS

SUBJECT: SERVICING 5D SERIES PERSONAL WORD PROCESSORS

DATE: August 15, 1988

This Bulletin provides information on the service support programs for the 5D Series Personal Word Processors. These models can be identified by the "5D" prefix in the serial number, and at this time include the following models:

MODEL NAME	MODEL PREFIX
PWP 3	5DCA
PWP 40	5DEA

SERVICE FEATURES

5D Series Personal Word Processors include several Keyboard entered service feature One of these is a self-typing program which also identifies the software version and tests the LCD. Another Keyboard service feature energizes the Element Motor for making adjustments. A new service feature for the 5D Series initiates a series of Diagnostic Tests that are performed by the electronics of the typewriter. These features are discussed in detail on page 6-14 of the Troubleshooting section of the Service Manual.

The 5D Series frame assembly and carrier are similar to the 5A Series Electronic Typewriter design. In all, there are nine adjustments which can be made with common service tools. No special test equipment, tools, or gages are required to service the machine, and most adjustments can be accessed with only the Mask/LCD Assembly removed.

DOCUMENT COMPATIBILITY

Documents created and stored on PWP 3 and PWP 40 Data Disks can be retrieved by the following 5C Series Models: PWP 5, PWP 6, PWP 6BL, PWP 7, and PWP 60.

Likewise, a document created on one of the above 5C Series PWP's can be retrieved on a PWP 3 or 40 as long as it does not exceed the memory capability of the model (32K on PWP 3, 42K on PWP 40).

PWP 3 & 40 OWNER'S MANUALS AND TUTORIAL DISKS

PART NUMBER	DESCRIPTION
781996	Owners Manual, USA, Canada, UK
768317	Tutorial, PWP 3
768318	Tutorial, PWP 40

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

- OVER -

Printed in U.S.A.

SERVICE PUBLICATIONS -- The following are available:

FORM NUMBER	DESCRIPTION
3-0762	Service Manual for 5D Series Personal Word Processors
3-0763	Parts Manual for PWP 3 & PWP 40

Updates to these publications and all other publications will be made by a Publications Bulletin that has the same base form number as the publication being updated. For example, the first update to the Service Manual (3-0762) will be Publications Bulletin 3-0762A, the next 3-0762B, etc. Reprints of a Manual (i.e. 3-0762-1, 3-0762-2) include all previously issued Publications Bulletins as indicated on the Contents Page of the reprint. The update pages should be inserted into the Manual in page number sequence.

SERVICE BULLETINS

Service Bulletins for the 5D Series Personal Word Processors are white with blue print. Bulletins are released when product changes occur and when additional information is required. They are consecutively numbered; however, number gaps in your Bulletins are likely to occur because Bulletins are issued only to those they apply to.

NOTE: Dealers receive one complimentary copy of each publication per mailing. Additional copies may be ordered from your parts ordering source. Dealers should contact their Regional Service Manager or sales representative to get on a mailing list.

SERVICE TOOLS

Tools useful for servicing 5D Series Personal Word Processors are listed on the Contents Page of the Service Manual (Form 3-0762) and are available from National Service Stores.

LUBRICANTS

Recommended lubricants are listed in the Lubrication and Cleaning Section of the Service Manual (Form 3-0762).

ORDERING PARTS

U.S.A. Dealers should refer to the current Parts Policies and Procedures for parts ordering and parts return procedures.

SERVICE TRAINING

Smith Corona offers one day service training programs in the field. Contact your Regional Service Manager or sales representative for details. Trainees should bring their Service Manual, tools, and a machine to the training class.

PRICES

Prices of parts, tools, etc., are indicated in the current Smith Corona Electronic Parts Price List. Also included are exchange prices for out of warranty replacement of PC Boards. Service Manual prices are $15.00; Parts Manual prices are $2.00. Service Bulletins are no charge when requested. All may be ordered from National Service Stores.

SMITH CORONA

SERVICE BULLETII

TO: Technical Service & Training
Regional Service Managers
Service Locations
Electronic Servicing Dealers
Canada & International

NO 2

PRODUCT:

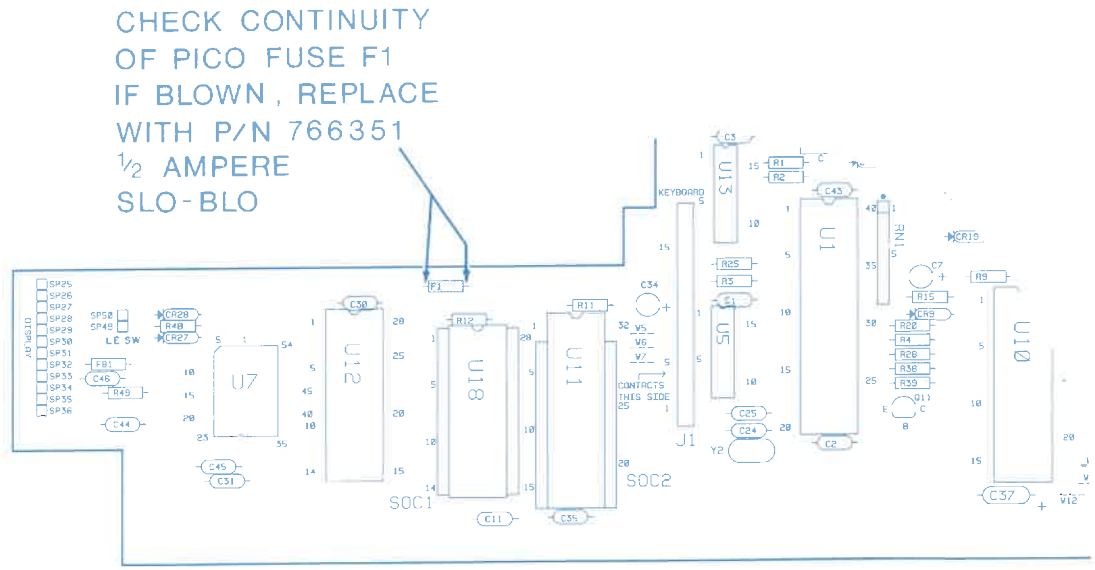
5D SERIES
PERSONAL WORD PROCESSORS

SUBJECT: PICO FUSE F1

DATE: September 30, 1988

Early production Model PWP 3 and PWP 40 Personal Word Processors used a 1/4 Ampere Pico Fuse (P/N 766350) on the Control PC Board (F1). Some false fuse failures were experienced by the factory; therefore, a stronger Pico Fuse (P/N 766351) is used on current Models PWP 3 and PWP 40.

If a PWP 3 or PWP 40 is returned for an EL Panel failure (Panel does not light), turn power off and check continuity of the Pico Fuse F1 on the Control PC Board (see illustration).



If the Fuse is blown, replace it with the 1/2 Ampere Pico Fuse (P/N 766351). Do not replace Control PC Board. Pico Fuse (F1) provides the 18 VDC input to the EL Panel Inverter and without this input the Inverter cannot supply the 120 VAC to light the EL Panel.

For prices refer to the current Smith Corona Parts Price List.

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

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SERVICE BULLET

TO: Technical Service & Training
Regional Service Managers
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Canada and International
Electronic Servicing Dealers

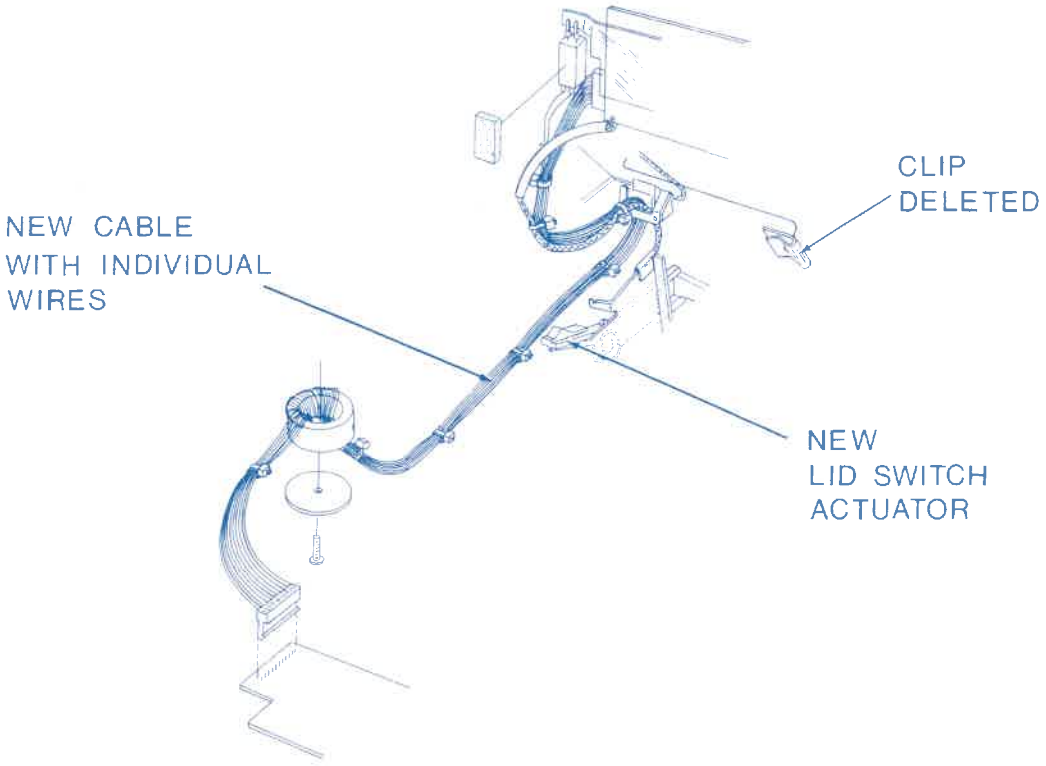
NO: 3

PRODUCT:
5D SERIES
ELECTRONIC TYPEWRITERS

SUBJECT: REDESIGNED LCD CABLE

DATE: September 30, 1988

PWP 3 and PWP 40 now incorporate a redesigned LCD Cable that uses individual wires instead o ribbon cable to eliminate wire breakage at the hinge. This wire breakage causes what appears to be LCD failure, which can also be caused by a tight cable pulling the cable connector off of the LCD connector. In addition, the Lid Switch Actuator was modified to improve wire clearance.



PART NUMBER	DESCRIPTION
768232	LCD Cable/Inverter Assembly
768530	Lid Switch Actuator
768640	Foam

Installation instructions are included on the reverse side.

- OVER -

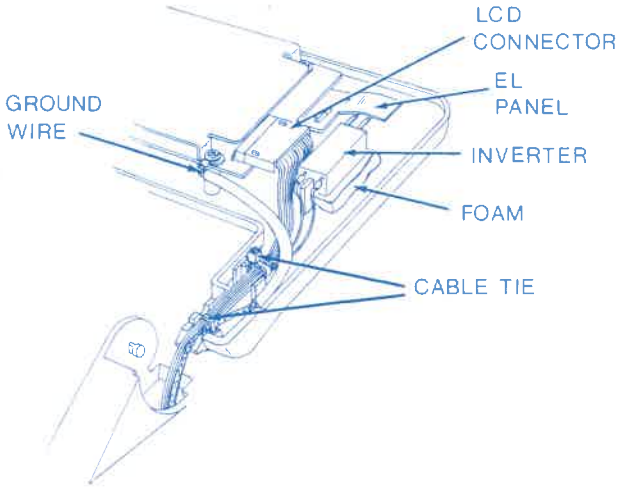
Printed in U.S.A.

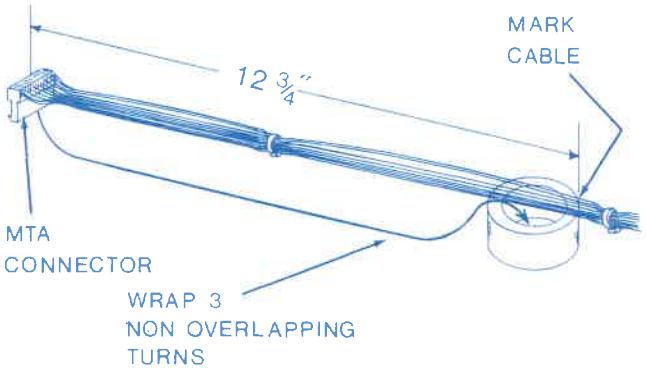
LCD CABLE INSTALLATION INSTRUCTIONS

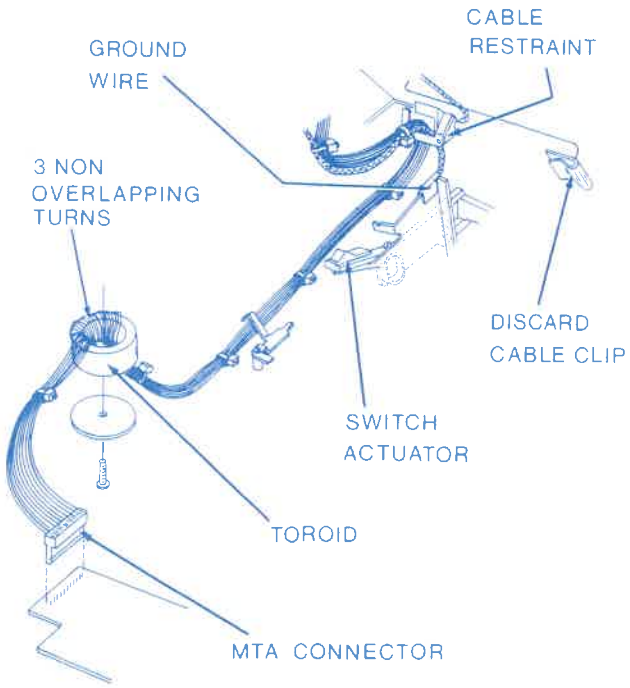
OBSERVE STATIC PRECAUTIONS

To remove the old LCD Cable/Inverter Assembly, follow Removal Procedure #5, Steps 1-7, and 10 & 11 in the 5D Series Service Manual, Form 3-0762. To install the redesigned LCD Cable/Inverter Assembly and Lid Switch Actuator follow this procedure:

1. Remove old Lid Switch Actuator on Frame Assembly, and replace with new Lid Switch Actuator, P/N 768530. NOTE: New Actuator uses the same spring as the old Actuator.
2. Connect the LCD Connector and Ground Wire to the LCD. Install Foam on the Front Side of Inverter. Place Inverter into the Inverter Well of Lower LCD Housing and connect EL Panel to Inverter.
3. Route LCD Ground Wire and LCD Wires in Lower LCD Housing as shown.
4. Hold wires in place and fasten Upper LCD Housing to Lower LCD Housing with Screws. Insert Screw Plugs in Upper LCD Housing.
5. Route 12 Pin MTA Connector End of Cable Assembly down through left LCD Housing opening of Mask.
6. Mount LCD Housing Assembly to Mask.
7. Remove and discard old Cable Clip that is adhered to the underside of Mask near the Cable Restraint.
8. Feed Cable with Ground Wire into Cable Restraint on Mask.
9. Make a mark on the new cable 12 3/4" from the 12 Pin MTA Connector End.
10. Hold the Toroid and place the cable mark on the outside edge of the Toroid.
11. Feed the 12 Pin MTA Connector through the center of the Toroid to make a complete wrap around the Toroid. Feed the MTA Connector through the Toroid center again for a second wrap, and continue for the third and final wrap. The individual wraps of cable ***should not*** overlap each other.
12. Place the wrapped Toroid over the Toroid Post of the Mask and secure it with the washer and screw. Connect MTA Connector to Control PC Board.
13. Connect Ground Wire to top of Left Side Frame.
14. Place Mask/LCD Assembly on Casing Base. Route new LCD Cable under Foot Retainer and form Retainer to the left so LCD Cable is secure in Casing Base.
15. Reverse Mask/LCD Removal procedure to replace remaining parts.







Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

SMITH CORONA

SERVICE BULLETI

TO: Technical Service & Training
Regional Service Managers
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Canada and International
Electronic Servicing Dealers

NO: 4

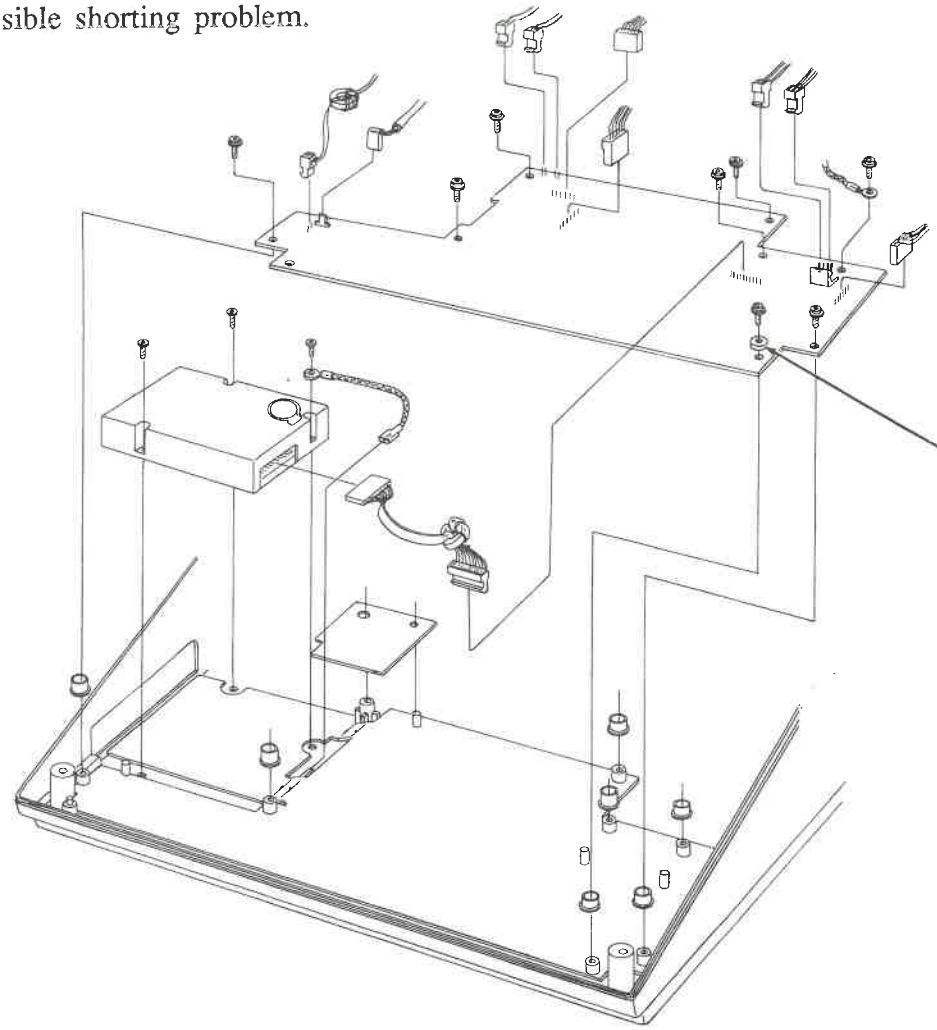
PRODUCT:
5D SERIES PERSONAL
WORD PROCESSORS

SUBJECT: **FIBER WASHER FOR CONTROL PC BOARD**

DATE: January 16, 1989

Current production Model PWP 3 and PWP 40 Personal Word Processors use a Fiber Washer (P/N 768670) under the Right Front Mounting Screw for the Control PC Board. This washer prevents the head of the screw from accidentally shorting the +5 VDC to ground on the Control PC Board.

When a PWP 3 or PWP 40 is returned for service, install Fiber Washer (P/N 768670) to prevent a possible shorting problem.



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SERVICE BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

NO: 5

PRODUCT: 5D SERIES PERSONAL WORD PROCESSORS

SUBJECT: **SHORT CARRIER CAPSTAN CABLE ASSEMBLY (768810)**

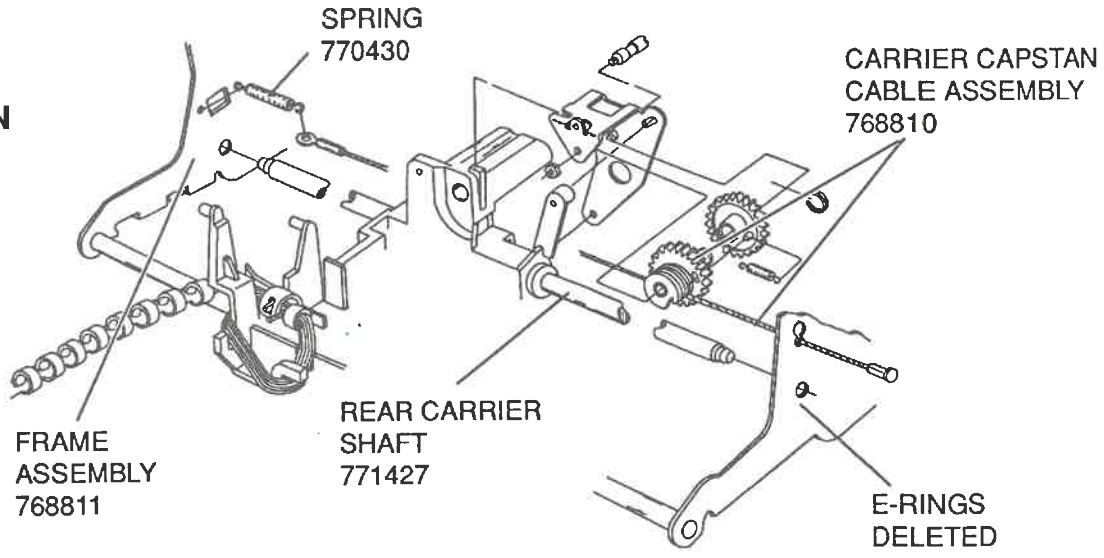
DATE: January 16, 1989

Short Carrier Capstan Cable Assembly (768810) and associated parts are illustrated and listed below. This new design provides better correction and print registration. In conjunction with this change, the E-Rings have been deleted from the Rear Carrier Shaft. This change was implemented for a short period, just prior to implementation of the Carrier Rack Drive System.

Unique service information is provided on the reverse side of this Bulletin.

Redesigned parts are not individually interchangeable with previous design parts.

SHORT CABLE DESIGN



PART NUMBER	DESCRIPTION
768810	Carrier Capstan Cable Assembly
770430	Spring
771427	Rear Carrier Shaft
768811	Frame Assembly

Previous design parts will remain available from Service Stores.

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

- OVER -

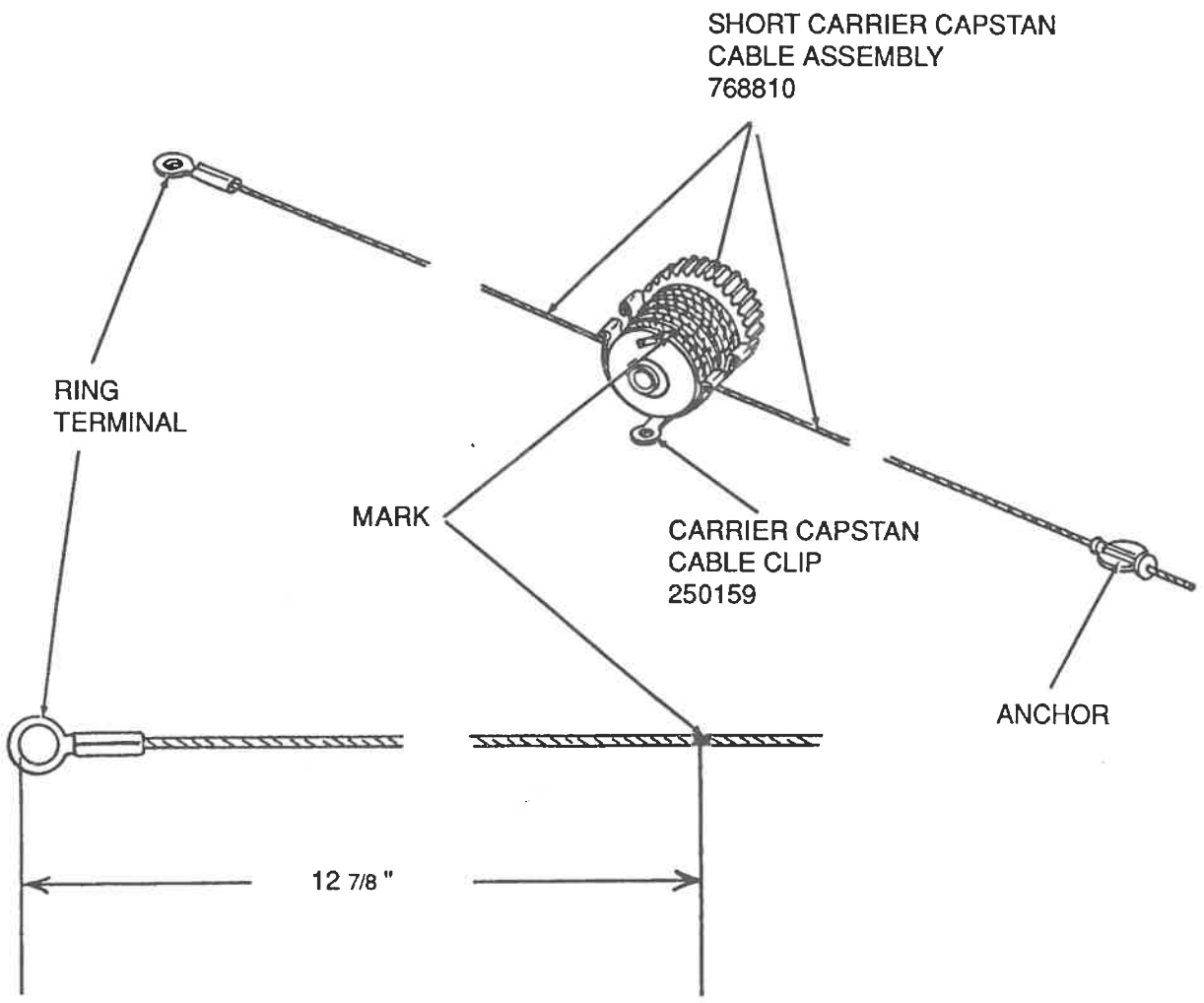
Printed in U.S.A.

SERVICE INFORMATION

The Replacement Procedure on page 4-16 of 5D Series Service Manual (3-0762) applies to the Long Carrier Capstan Cable Assembly.

When replacing a Short Cable Assembly, mark the Cable approximately 12.9" (12 7/8") from the Ring Terminal instead of the dimension called for in the procedure (Replacement, Step A). Also, the Cable does **not** route around a guide in the Left Frame, since the Spring at the Ring Terminal end of the Cable attaches directly to the Left Frame (Replacement, Step F).

All other steps in the Replacement procedure apply to the Short Carrier Capstan Cable Assembly.



SMITH CORONA

SERVICE BULLETI

TO: Technical Service & Training
Regional Service Managers
Service Locations
Electronic Servicing Dealers
Canada & International

NO: 6

PRODUCT:
5D SERIES PERSONAL WORD PROCESSORS

SUBJECT: **CARRIER RACK DRIVE SYSTEM**

DATE: January 16, 1989

Recent production includes a new Carrier Rack Drive System that eliminates the previous Carrier Capstan/Cable Drive System. The Carrier moves left or right by the rotational mesh of the Carrier Motor Gear Teeth in the Teeth of the Carrier Rack. A spring loaded Anti-Backlash Slider mounted above the Carrier Rack maintains constant pressure between the teeth of the Carrier Motor Gear and Carrier Rack.

Various changes occurred to other parts such as the Carrier Return Bracket, Frame Assembly, Carrier Motor, and Line Indicator Screw; therefore, the new parts are not interchangeable with the previous design.

There are no new adjustments or lubrication points for the Carrier Rack Drive System.

Illustrated on the reverse side of this Bulletin are the parts with the appropriate part numbers for the new parts.

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

- OVER -

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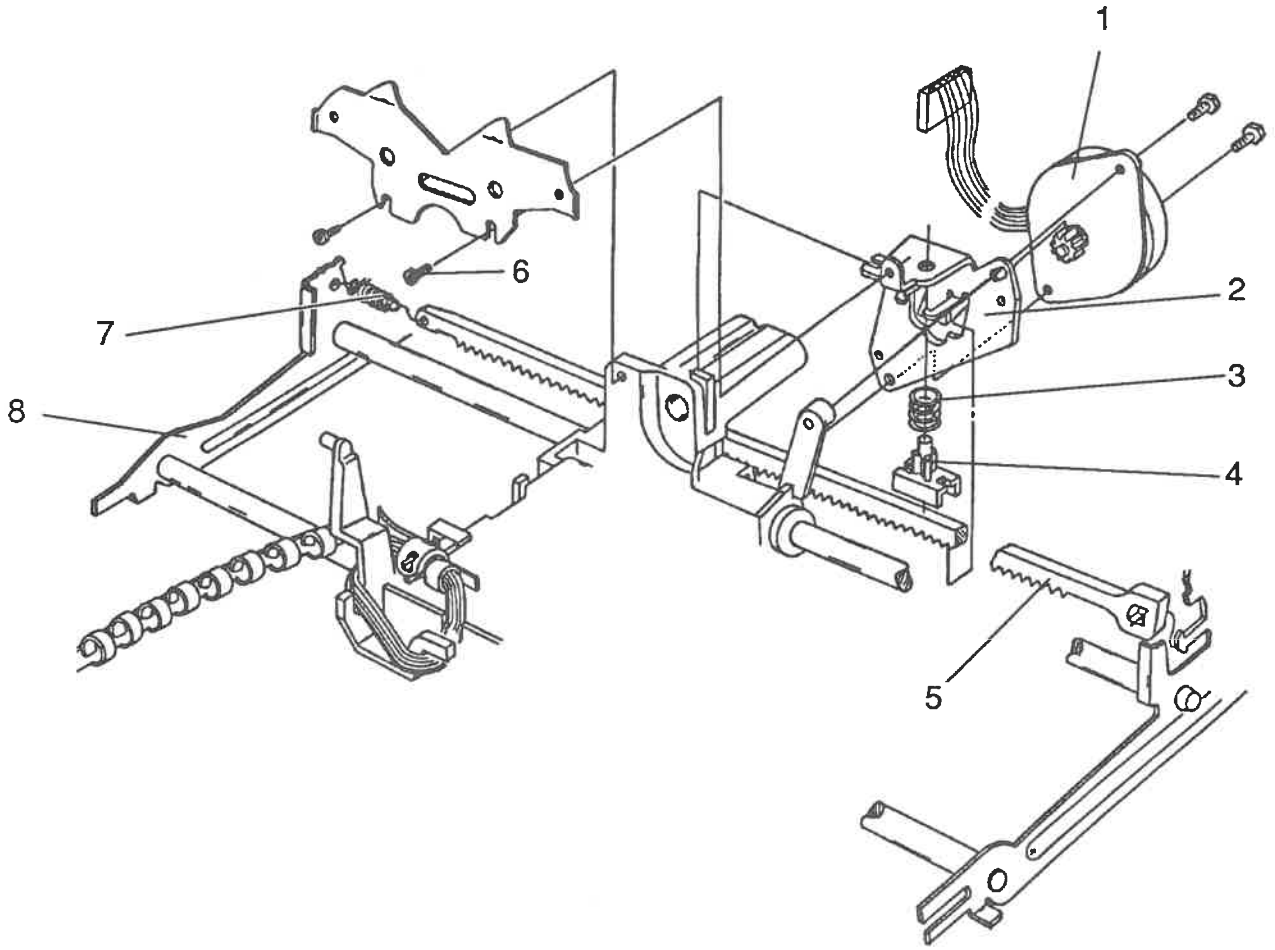

REF	PART NUMBER	PART NAME	QTY
1	770173	Carrier Motor Assembly (50 ohms)	1
2	768662	Carrier Return Bracket	1
3	751719	Spring	1
4	768668	Anti-Backlash Slider	1
5	768669	Carrier Drive Rack	1
6	781910	Screw	1
7	768661	Spring	1
8	768591	Frame Assembly Complete	1

The Capstan/Cable Drive System parts will remain available from Service Stores.

SMITH CORONA

SERVICE BULLETIN

TO: Technical Service & Training
Regional Service Managers
Service Locations
Canada & International
Electronic Servicing Dealers

NO: 7

PRODUCT:
5D SERIES PERSONAL WORD PROCESSORS

SUBJECT: **SERVICING NEW 5D SERIES PERSONAL WORD PROCESSORS**

DATE: May 15, 1989

This Bulletin provides information on the service support programs for new 5D Series Personal Word Processors. These models can be identified by the "5D" prefix in the serial number, and at this time include the following models:

Model Name	Model Prefix	Model Name	Model Prefix	Model Name	Model Prefix
PWP 3	5DCB	Mark X PWP	5DWA	PWP 55D	5DDA
PWP 2000	5DEB	Deville PWP 3	5DKA	PWP X15	5DSA

CoronaCalc Compatibility: PWP 2000 is the only 5D Series PWP that is compatible.

Service Features:

New 5D Series Personal Word Processors include several Keyboard entered service features. One of these is a self-typing program which also identifies the software version and tests the LCD. Another Keyboard service feature energizes the Element Motor for making adjustments. A new service feature initiates a series of Diagnostic Tests that are performed by the electronics of the word processor. These features are discussed in detail on page 6-14 of the Troubleshooting Section of the Service Manual (Form 3-0774).

The new 5D Series frame assembly and carrier are similar to the 5A Series Version 2 electronic typewriter design. In all, there are eight adjustments which can be made with common service tools. A redesigned Left End Switch eliminates the Left End Switch adjustment. No special test equipment, tools, or gages are required to service the machine, and most adjustments can be accessed with only the Mask/LCD Assembly removed.

Document Compatibility:

Documents created and stored on PWP 3 and PWP 2000 Data Disks can be retrieved by the following models: PWP 5, PWP 6, PWP 6BL, PWP 7, PWP 40, & PWP 60.

Likewise, a document created on one of the above PWP's can be retrieved on a PWP 3 or PWP 2000 as long as it does not exceed the memory capability of the model (32K on PWP 3, 42K on PWP 2000).

Owner's Manuals:

Part No.	Country/Language
783619	USA & Canada
783620	French Canadian
783621	Spanish American
783622	UK & Australia

Tutorial Disks:

Part No.	Country/Language/Model
768690	USA & Canada, PWP 2000
768691	USA & Canada (all models listed above except PWP 2000)
768692	French Canadian, PWP 2000
768693	French Canadian, PWP 3
768694	UK, Australia, PWP 2000
768695	Spanish American, PWP 2000

- Over -

Printed in U.S.A.

Service Publications: The following publications should be inserted in the original 5D Series 3-Ring binder (white with blue graphics):

Form Number	Manual Description
3-0774	Service Manual for new 5D Series
3-0775	Parts Manual for Models PWP 2000, PWP 3, Mark X PWP, PWP 55D, PWP X15, and Deville PWP 3

Updates to these publications and all other publications will be made by a **Publications Bulletin** that has the same base form number as the publication being updated. For example, the first update to the Service Manual, Form 3-0774 will be Publications Bulletin 3-0774A, the next update will be 3-0774B, and so on. Update pages should be incorporated into the Manual. Re-prints of a Manual (i.e. 3-0774-1, 3-0774-2, etc.) will include all previously issued Publications Bulletins as indicated on the Contents Page of the reprint.

Service Bulletins:

Service Bulletins for the new 5D Series Personal Word Processors will be white with blue print. Bulletins are released when product changes occur and when additional information is required. Bulletins are consecutively numbered; however, number gaps in your Bulletins are likely to occur because they are issued only to those they apply to. For example, Dealers would not receive an exclusive Bulletin on a private label model. **Note**: Dealers receive one complimentary copy of each publication per mailing. Additional copies may be ordered from your parts ordering source. Dealers should contact their Regional Service Manager or sales representative to get on a mailing list.

Service Tools: The tools required to service 5D Series are listed on the Contents Page of the Service Manual (Form 3-0774). Most should be available from local suppliers, but may be ordered from your Smith Corona parts ordering source.

Lubricants: Recommended lubricants are listed in the Lubrication and Cleaning Section of the Service Manual (Form 3-0774).

Ordering Parts: USA Dealers should refer to the current Service Parts Policies and Procedures form for parts ordering and parts return information.

Service Training: Smith Corona offers one day service training programs in the field. Contact your Regional Service Manager or sales representative for details. Trainees should bring the Service Manual, tools, and a machine to the training class.

Prices: Prices of parts, tools, etc., are indicated in the current Smith Corona Electronic Parts Price List. Also included are exchange prices for out of warranty replacement of PC Boards. Service Manual prices are $15.00; Parts Manual prices are $2.00. Service Bulletins are no charge when requested. All may be ordered through National Service Stores.

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

SMITH CORONA

5D SERIES
Personal Word Processors

COMMITMENT TO EXCELLENCE
SMITH CORONA
MADE IN U.S.A.

SERVICE MANUAL

Printed in U.S.A. Form 3-0774
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PREFACE

This Manual provides service information for the following Smith Corona 5D Series Personal Word Processors:

Model Prefix	Model Name	Color(s)
5DCB	PWP 3	Silver Fog
5DSA	PWP X15	Silver Fog
5DWA	Mark X PWP	Silver Fog
5DEB	PWP 2000	Platinum
5DDA	PWP 55D	Platinum
5DKA	Deville 10 PWP	Silver Fog

The Manual is divided into sections that cover the different service areas required to service the machine. Thus, there is an Adjustment Section, Removals Section, etc. Refer to the Contents Page for a listing of subjects covered.

Except for the Specifications Sections, there is an Index of all information provided in each Section at the beginning of the Section.

Throughout the Manual, directional terms such as front, rear, top, bottom, left, right, etc., always refer to the machine as used by a typist. Consequently, "right" always refers to the Platen Knob side of the word processor, regardless of the machine position necessary for checking a requirement or making an adjustment.

Satisfactory performance requires that all parts be properly adjusted and lubricated, and their movements be free of binds. Worn or broken parts should be replaced.

IMPORTANT

Some service procedures require working with static sensitive devices, such as the Printed Circuit Boards. Whenever a procedure involves one of these devices, the procedure is marked:

OBSERVE STATIC PRECAUTIONS

Read the reverse side of the Contents Page (Page ii) carefully for a full understanding of procedures to follow when working with static sensitive devices.

5D SERIES PERSONAL WORD PROCESSORS SERVICE MANUAL

CONTENTS

	Section	Subject
	1	Specifications
	2	Theory of Operation
	3	Lubrication & Cleaning
	4	Removals
	5	Adjustments
	6	Troubleshooting
	7	Diagrams
→	8	Diagrams -- Revision B Electronics

SERVICE TOOLS

In addition to common service tools (screwdriver, pliers, volt/ohmmeters, etc.) normally required for typewriter service, the following tools are needed for servicing 5D Series Personal Word Processors:

Part Number	Description
250065	#0 Phillips Screwdriver
250072	MTA Wire Inserter (.100" Centers)
250073	Feeler Gage Set .0015"-.025"
250101	MTA Wire Inserter (.156" Center)
250183	Torx T-10 Screwdriver
250165	Torx T-8 Screwdriver

Revised 11/89

STATIC ELECTRICITY

Static electricity in the service work area damages PC Boards. Smith Corona Typewriters and Word Processors are equipped with state of the art MOS IC's that are susceptible to damage by static electricity.

Damage can occur when handling or touching a PC Board or even when touching a connecting pin or wire that leads to the Board.

Static electricity is sometimes tough to identify. It takes about 10,000 volts of static electricity to feel a "zap" or see a spark. As little as 1000 volts can damage an IC. A person wearing synthetic soled shoes walking across a carpet in low humidity conditions can generate a charge of over 35,000 volts, enough to destroy all the MOS IC's on a PC Board.

Furthermore, static induced failures do not always occur immediately following exposure, but may result in latent defects that show up in time.

RECOMMENDED STATIC PRECAUTIONS

- Do not have carpeting in the service area or on the workbench. Use an anti-static floor sealant on floor surfaces, particularly on vinyl surfaces.
- Connect metal workbenches to ground with a one Meg Ohm resistor cord. Use conductive anti-static work mats, or particle board or wood as a work surface.
- Wear a wrist strap that is connected to ground through a one Meg Ohm resistor whenever working on a machine with the top cover off, and, of course, when handling a PC Board, in or out of the pink shipping bag.
- Do not allow synthetic fiber clothing (polyester, nylon, etc.) to contact machine components or the PC Board.
- Do not slide a PC Board over any surface.
- Keep the following static generators away from the work area: *Styrofoam (including coffee cups) -- Candy wrappers -- Cellophane*

Note: The pink bag in which Boards from Service Stores' are shipped ***does not*** induce a static charge, but it also ***does not*** prevent a static charge from going through to the PC Board. Take static precautions when handling a bagged Board.

The following anti-static equipment is available from National Service Stores:

Part Number	Description
250166	Velcro Adjustable Wrist Strap. Has snap connection for Coiled Cord.
250167	10 Foot One Meg Ohm Coiled Cord. Has banana plug for connection.
250168	Alligator Clip. Used for connecting Coiled Cord directly to an available ground.
250096	Circuit Tester with Ground Jack. Used for connecting Coiled Cord to a power outlet's ground. Particularly useful when no other ground point is available. Circuit Tester also checks for correct wiring and polarity.
250501	Anti-Static Floor Sealant (1 gallon).

5D SERIES PERSONAL WORD PROCESSORS SERVICE MANUAL

CONTENTS

Section	Subject
1	Specifications
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SECTION 1

SPECIFICATIONS

Power Supply

Power Requirements: *See Electrical Rating Label on Bottom of Casing Base.*

117 VAC/60 Hz ± 10%
or
220 VAC/50 Hz ± 10%
or
240 VAC/50 Hz ± 10%

Fuse Protection:	.75 Amp, Slo-Blo
Transformer Output:	25.5 VAC to 42.4 VAC (No load) 17 VAC to 23 VAC
Power Supply PCB Output:	+18 VDC +6.5 VDC +5 VDC -13 VDC
Approx. Power Consumption:	20 Watts (Idle) 70 Watts (Printing)

Printing/Paper Handling

Printing Technique:	Fully formed character Daisy Print Element
Character Set:	96 printable characters on Print Element
Character Spacing (Pitch):	10 CPI: .100" (2.5mm) per space 12 CPI: .083" (2.2mm) per space
Typing Line Length:	8.9" (226.1mm) 10 Pitch: 89 Characters per line 12 Pitch: 107 Characters per line
Print Speed:	13 Characters per Second (maximum)
Print Direction:	Typewriter Mode: Uni-directional (left to right) Word Processor Mode: Bi-directional
Margins:	Left Margin preset at space 12 (10 pitch) Right Margin preset at space 72 (10 pitch)
Tabs:	One Preset at Space 17 (10 pitch); up to 8 programmable tab settings

Printing/Paper Handling (continued)

Ribbon Cassettes:	**Correctable Carbon**	**Multi-Strike**
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	53,000 Characters	205,000 Characters
Correction Tapes:	**Lift Off (for Correctable)**	**Cover up (for Multi-Strike)**
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	1400 Characters	1400 Characters

Stepper Motors: 4 Phase, Bi-directional, Permanent Magnet Stepper Motors

	Carrier	**Element**	**Index**
Step Angle:	7.5°	7.5°	7.5°
Steps Per Revolution:	48	48	48
Resistance Per Phase:	50 Ω	24 Ω	50 Ω
Run Voltage:	+18 VDC	+18 VDC	+18 VDC
Hold Voltage:	+5 VDC	None	None

Paper Feed: Friction, Single Sheets or Forms

Linespacing:
- 1 (6 Lines per Inch)
- $1^1/_2$ (4 Lines per Inch)
- 2 (3 Lines per Inch)
- $^1/_2$ through Code Key for Super and Subscript
- Variable through Platen Knob

Maximum Paper Width: 12" (304.8mm)

Paper Capacity: 1 original plus 2 copies

Keyboards

Keyboard:
- 44 Printable Character Keys
- 12 Function Keys
- 56 Molded Dome Conductive Switches with Leaf Return Springs
- 7 x 8 Electronic Keyboard Matrix

Cursor Keypad:
- 5 Function Keys
- 5 Molded Dome Conductive Switches
- 1 x 5 Electronic Keyboard Matrix

Electronics

Control PC Board:

Master Microprocessor: Z80B--Master Controller for all machine functions

Slave Microprocessor: (Programmed 8053)

- Scans Keyboard, Left End, and Mode Switches
- Controls Stepper Motors & Solenoids

ASIC: (Applications Specific Integrated Circuit)

- Disk Controller
- RAM Controller
- ROM Controller
- Model Selector
- Clock Generator

Dictionary ROM: 1 or 2 Megabits (depending on language)

Other ROM: PWP 3: 1 Megabit ROM
PWP 2000: 1 Megabit EPROM

- Initialization routines
- Operating software
- All disk, typing, and printing routines

RAM: (Two 64 K x Four bit DRAMs)

- 55 Character Keyboard Buffer
- One Line Correction Buffer (in Typewriter Mode Only)
- 42,000 Character Word Processor Memory (PWP 2000)
- 32,000 Character Word Processing Memory (PWP 3)

Other: LCD Controller Module

Power Supply: (Produces Four DC Outputs)
+5 VDC
-13 VDC
+6.5 VDC
+18 VDC

System Physical Dimensions

- Height: 5.72" (145.3mm)
- Width: 16.85" (427.9mm)
- Depth: 16.13" (409.7mm)
- Net Weight: 16.5 lbs (7.5 Kg) with Casing Lid & Power Cord

System Environmental Conditions

Operating Temperatures: • 55° F to 100° F (13° C to 38° C)
Operating Relative Humidity: • 30% to 80%
Storage Temperature: • 14° F to 122° F (-10° C to 50° C)
Storage Relative Humidity: • 20% to 90%

Liquid Crystal Display (LCD)

Color:	Transmissive Mode Super Twist LCD w/Blue/Violet Dots
Actual Display Area:	
Width:	80 Columns 480 Dots 9.258" (235.1mm)
Height:	7 Lines 64 Dots 1.233" (31.3mm)
Power Requirements:	• Logic Power Supply: +5 VDC • Liquid Crystal Driver Supply: -13 VDC • Liquid Crystal Driver Operating Voltage: -13 VDC to 0 VDC • EL Panel (White): 120 VAC @ 600 Hz (inverted from +18 VDC)
Dimensions (Approximate):	Width: 10.986" (279.1mm) Height: 3.0" (76.2mm) Depth: .437" (11.1 mm)

Disk Drive

Type:	Single track spiral drive capable of storing and retrieving data from a double sided, single track storage disk
Disk Rotating Speed:	423 RPM + 2.5%
Data Transfer Rate:	101.5625 kBPS (Kilobits per second)
Magnetic Storage & Retrieval:	Double sided, digital recording, storage, and retrieval medium, with 50 k storage in a maximum of ten files per side when prepared
Magnetic Storage Medium:	3" Smith Corona DataDisk, double sided, double density
Power Requirements:	Logic Voltage: +5 VDC Motor Voltage: +6.5 VDC
Dimensions (Approximate):	Length: 5.213" (132.41mm) Width: 3.905" (99.19mm) Height: 1.144" (29.06mm)

SECTION 2

THEORY OF OPERATION

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2-2 THEORY

1) Power Supply

When the Personal Word Processor's AC plug is inserted into an AC outlet and the Power Switch is turned on, line voltage is applied to the primary winding of the transformer. Voltage is induced by two separate secondary windings of the transformer to produce two separate secondary voltages, 24 VAC and 18 VAC.

The **24 VAC** is applied to the Bridge Rectifier CR10 on the Control PC Board, which provides approximately 24 VDC input to the following:

A) **18 Volt Regulator Circuit:** The major components are Q13, L1, and U14. Together these components produce a regulated +18 VDC ± 6.5%.

B) **6.5 Volt Regulator Circuit:** Components Q9, U15, L2, C29, and CR24 make up the 6.5 Volt Regulator Circuit, which provides a regulated +6.5 VDC ± 6.5% to various components and to Regulator U16.

Regulator U16 provides a regulated +5 VDC ± 5%.

The **18 VAC** from the other transformer secondary winding is half wave rectified by components CR25 and C23. This half wave voltage is regulated by Zener Diode CR26 at -13 VDC ± 4%.

If the +5 VDC drops to zero volts, R36, R37, & R42 allow transistor Q5 to conduct which in turn shorts the -13 VDC to ground. This is a safety circuit to turn off the -13 VDC to the Liquid Crystal Display (LCD) if the +5 volt regulator fails.

The **+5 VDC** is used for Integrated Circuits, Shift Lock LED, Liquid Crystal Display (LCD), Carrier Holding Voltage, and Disk Drive.

The **+6.5 VDC** is used for driving the Disk Drive Motor.

The **+18 VDC** is used for driving the Carrier Motor, Element Motor, and Index Motor, the Hammer Solenoid and the Ribbon Solenoid, the DC/AC Inverter, and some discrete PC Board Components.

The **-13 VDC** is used for the Contrast Control potentiometer and the LCD.

The Control PC Board has a Watchdog Control circuit that monitors correct voltage to the following components:

A) Hammer Solenoid

B) Ribbon Solenoid

If any of these components are left on, the Watchdog circuit places a high at Pin 9 (Reset) of the 8053 microprocessor. This forces the 8053 to reset and start the initialization process all over again. If the condition is ***not*** cleared, the Watchdog Circuit repeats its action, and reinitialization occurs again.

For safety, the AC Power Supply has a replaceable .75 Ampere Slo-Blo Fuse mounted in the Power Cord Receptacle. Also, there is a .5 Ampere Pico Fuse mounted on the Control PC Board to protect the 18 Volt Power Supply Circuit. If the Inverter for the EL Panel draws excessive current, the Pico Fuse blows.

2) Initialization

The initialization sequence is described in full detail in the troubleshooting section of this manual. Briefly, the sequence is as follows:

A) When power is turned on, the Ribbon Solenoid quickly energizes to insure the Ribbon mechanism is in its proper starting position.

B) The Electronics moves the Carrier slightly to the right, to insure Carrier is not at the Left End Switch and then slightly to the left to insure the Carrier is not at the right end of the machine.

C) The Index Motor Shaft rotates 1/2 forward linespace and then 1/2 reverse linespace to establish a positive writing line.

D) Then, the Element Motor rotates quickly to snap the Element onto the Drive Disc, and then stops.

E) The Carrier moves left until the Left End Switch Positioner closes the Left End Switch; quickly moves right to open the Switch; left to close the Switch again; and continues approximately .100" further before stopping.

F) The Element rotates slowly counterclockwise until the Left End Switch Positioner drops into the Element Home Notch on the Rear Scissors Gear under Spring Tension, which opens the Left End Switch, and the Element stops rotating.

G) The Carrier moves right approximately .250" to establish position "0," and then continues to the preset left margin (Space 12). The default settings are 10 pitch, with Left Margin at 12, one Tab set at 17, and Right Margin at 72.

H) The LCD is turned "On." First the Smith Corona Copyright Message is displayed, followed by the Typewriter Status or Word Processor Main Menu.

The Left End Switch is also used as a Lid Switch. Whenever the Deck is raised, the Lid Switch Actuator closes the Left End Switch through Spring tension, and the Carrier moves to the approximate center of the Platen. When the Deck is closed, the Switch opens, and the Carrier reinitializes and relocates to its previous position.

3) Keyboard

The Keyboard is composed of Keybuttons mounted in a plastic housing along with individual leaf-type springs, molded Dome Conductive Switches, a Flexible Circuit PC Board, and a metal plate. When a Keybutton is depressed, the Keybutton contacts the leaf-type spring, which in turn pushes down on a Molded Dome Conductive Switch. The Conductive Switch then comes into contact with the 7 x 8 matrix Flexible Circuit PC Board which now completes a circuit between a specific Column and Row. This completed circuit is then read by the Electronics of the Control PC Board, which determines what key was depressed.

The Keypad is composed of Keybuttons mounted in a plastic housing, molded Dome Conductive Switches, a Flexible Circuit PC Board, and a metal plate. The Keypad Flexible PC Board is a 1 column x 5 row matrix. The matrix consist of an open electrical circuit which is closed by a conductive molded Dome Switch. Refer to the appropriate Diagrams in the Diagrams Section for Layout and Matrix Charts.

3) Keyboard (continued)

A) Key Scanning: When a Keybutton is depressed, the Molded Dome Switch closes a circuit between the Column and Row in the Keyboard Matrix. The Keyboard Matrix Rows are normally held in a high state. When a circuit closes between a Row and a Column, the Row is pulled low. The 8053 Microprocessor senses this low state, and sequentially pulses Columns C7 through C0 every 5 milliseconds to determine which key was depressed. The Electronics determines which Keybutton was depressed by comparing which "C" Column was pulsed at the point in time that the "R" Row became active. If the same "R" Row and "C" Column activity is detected through two scanning cycles, the Electronics interprets this as a valid Keybutton depression and activates the circuits to perform the appropriate function. If no Key is depressed, the electronics keeps all rows high to quickly identify a depressed key. After that Keybutton is identified, the electronics returns to sequentially pulsing the Keyboard Rows for a short time before returning to a standby state.

When any Keybutton is held down, the Electronics delays 500ms after performing a function to verify that a repeat is desired, and then activates the circuits to continue performing that function until the Keybutton is released.

The 8053 monitors the Mode Selector Switch and Left End Switch ports every 12.5ms to insure that the status of these ports is correctly interpreted. If either of these ports is pulled low, the 8053 activates the appropriate circuit in response to this input.

B) Non-Matrix Keyboard Functions: The Shift Lock LED lights when the Shift Lock Key is depressed. When the LED is on, the electronics performs all printing functions in upper case. When either Shift Keybutton or the Shift Lock Keybutton is subsequently depressed, the Electronics turns the LED off, and printing resumes in lower case.

4) Electronics

The Control PC Board includes the DC Power Supply, Logic, Power Driver, and Memory (RAM & ROM) circuitry. The functions of the Control PC Board are described below:

The **Control PC Board** is the heart of the PWP. It provides DC Operating Voltages, controls input data, makes decisions, and controls output data and signals. The Transformer provides separate AC input voltages of 24 VAC and 18 VAC to the Control PC Board. The 24 VAC produces three DC Voltages: +5 volts, +6.5 volts, and +18 volts. The 18 VAC produces one negative DC voltage, which is -13 volts.

Input components to the Control PC Board include Left End/Lid Switch, Mode Selector Switch, Keyboard, Keypad, and Disk Drive.

The two main decision making IC's on the Control PC Board are the Motor Controller (8053) Microprocessor and the Memory Controller (Z80) Microprocessor.

The Motor Controller (8053) Microprocessor responds to commands from the Memory Controller (Z80) Microprocessor and determines which motors and solenoids must be energized to perform a function, and when and for how long they must be energized. The Motor Controller activates the circuits to perform the function, and signals the Memory Controller (Z80) that the function has been performed. The 8053 Monitors the Left End Switch during initialization and during machine operation to check if the switch was closed due to the Deck being raised. Also, the Motor Controller interprets the information it receives from scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch. After interpretation, the Motor Controller reacts and communicates with the Memory Controller (Z80). Finally, the Motor Controller (8053) provides a Reset (ZRESET) to the Memory Controller (Z80) during a power up initialization or a Watchdog time out.

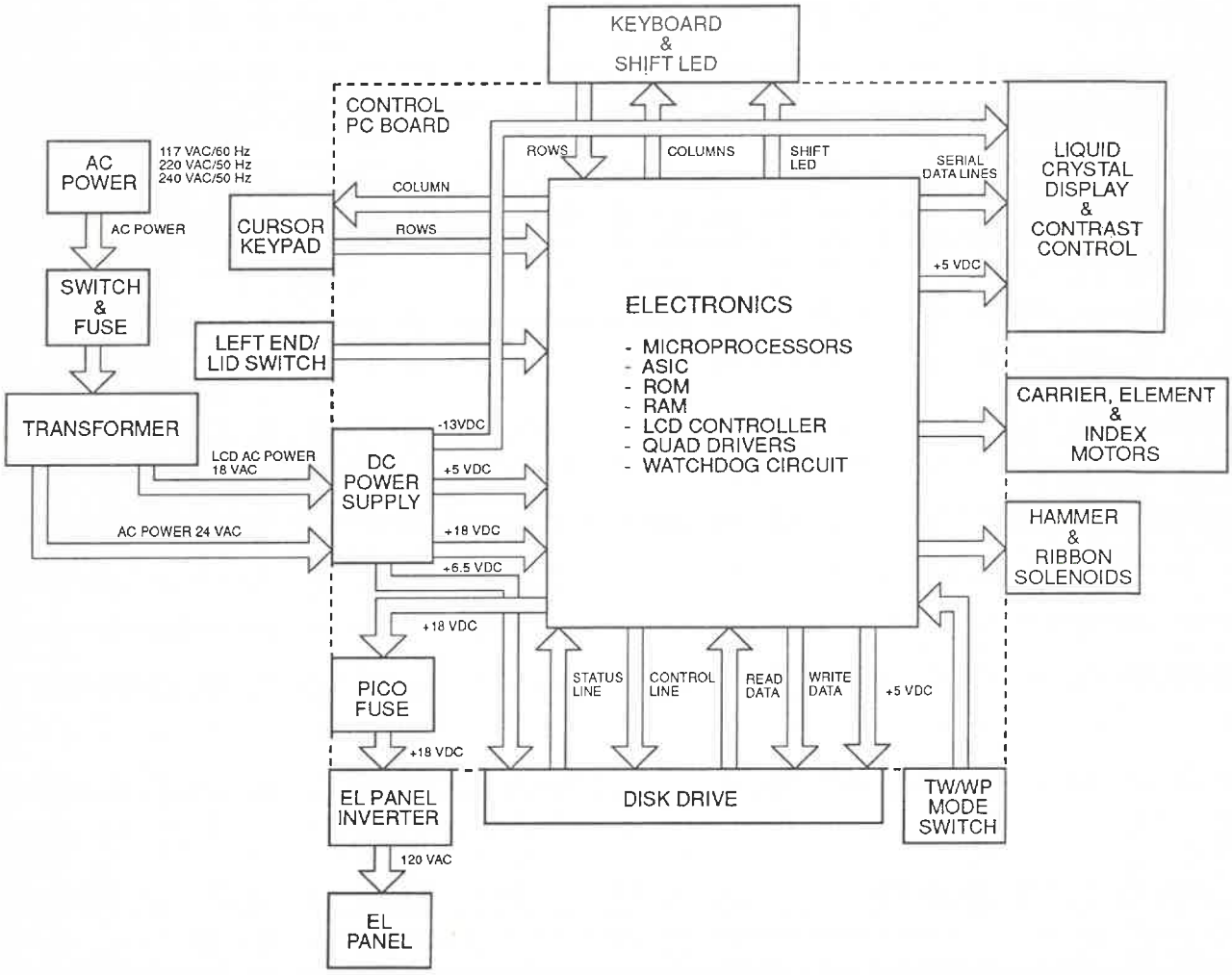
4) Electronics (continued)

The **Z80 Microprocessor** sends and receives information to the LCD Controller, ASIC, Operating ROM, and Motor Controller (8053) Microprocessor. The Z80 and 8053 constantly communicate with each other in order to maintain proper timing and keep the operating functions in proper sequence so everything runs smoothly.

The Applications Specific Integrated Circuit (ASIC) is a state of the art (84 pin) integrated circuit. Basically, it is an Address Decoder, USART, and Frequency Divider which performs the following functions:

A) **Disk Controller** -- controls the data flow to and from the Disk Drive.
B) **RAM Controller** -- insures that the RAM is refreshed and has to choose whether to read the RAM or the ROM.
C) **ROM Controller** -- controls the Chip Enable for the different types of program ROM's used.
D) **Model Selector** -- tells the Z80 the Model (PWP 3 or PWP 2000) that the Board hardware is set for.
E) **Clock Generator** -- produces different Frequency Clock signals from the Main Crystal (16.25 MHz) that are used by other IC's.

ELECTRONIC BLOCK DIAGRAM



5) Liquid Crystal Display

The Liquid Crystal Display (LCD) is an 80 columns (characters) wide by 7 lines high electronic dot display. Each character is 5 dots wide by 7 dots high. The color of the display is Silver Tone with dark blue/violet dots. The programming for the lines on the display is such that a blank dot appears between lines for clear readability. The LCD requires +5 VDC and -13 VDC to operate. Electronic data is sent from the Control PC Board to the LCD. Electronic drivers on the LCD turn on the required dots to form each individual character. The contrast of the characters formed in the Display is regulated by the Contrast control. This control is a sliding potentiometer that in effect varies the -13 VDC from -13 VDC to 0 VDC.

Behind the LCD is an Electro-Luminescent (EL) Back Light Panel. This panel provides back lighting for the LCD, which allows easy readability of the LCD in low light environments. The EL Panel operates on 120 VAC which is provided by a DC/AC Inverter. The input to the Inverter is +18 VDC and the output is 120 VAC @ 600 Hz.

6) Disk Drive

The Disk Drive is a single track spiral drive capable of storing and retrieving data from a 3 inch double sided, double density, single track storage disk. The Disk Drive requires +5 VDC for Logic Voltage and +6.5 VDC for Disk Drive Motor Voltage. The Disk Drive prepares (formats) the disk into 50 1K sectors (excluding the Directory). This allows 50K of text storage in a maximum of 10 files for each side of the disk for a total of 100K of text in up to 20 files per disk.

Normal rest position for the Head of the Disk Drive is near the end of the inside edge of the disk storage area. When a file is recalled or stored, the Disk Drive rotates and the head moves briefly toward the inside edge then quickly to the outside edge of the disk. It continues until it again reaches the rest position and Head and Disk Drive motor movement stops. This rest position allows the disk to be up to operating speed by the time the Head moves to the outside edge where the Directory information is stored. Once the Directory information is stored or read, then the head passes over an area where text is stored or read. Movement continues until rest position is reached once more.

The Control PC Board provides electronic data, power voltages, and communications to the Disk Drive through the ASIC chip When information is stored on the disk, the ASIC internally converts Parallel data to Serial data. The Serial information is then processed internally by the Disk Controller which converts this Serial information to a Modified Frequency Modulation (MFM) signal. This MFM signal is then sent to the Electronics of the Disk Drive for processing and text storage to the disk. The opposite sequence occurs when information is read from the disk and sent to the ASIC chip.

7) Stepper Motors

There are three unipolar, four phase, Permanent Magnet Stepper Motors in the machine--the Index, Carrier, and Element Motors.

A) Construction

Each Stepper Motor is made of a radially magnetized Rotor with alternating North and South Poles, and two Stator Sections, A and B.

The Stator Sections each have Bifilar coils wound around a plastic bobbin in the inside diameter of the Stator. When the two Stator Sections are assembled, the teeth of one section are aligned one half tooth away from similar teeth in the other section.

Opposite ends of the Bifilar coils are connected internally and brought out of the stator through a common lead wire. The other end of each coil can be switched to ground through the Electronics. Only one coil of each Bifilar pair is switched to ground at any given time. There are two Bifilar pairs in the stator. The windings in one pair are referred to as A and A^{1}, and the windings in the other pair are called B and B^{1}. The direction of current flow is the same in windings A and B, which is opposite to the direction of current flow in A^{1} and B^{1}. The current flowing through the coil creates lines of magnetic flux which charge the Stator Teeth as either North or South Poles. The Stator is constructed so that adjacent teeth are opposite poles when current is flowing through the coil. When current flows in the opposite direction, the polarity of the Stator Teeth changes to attract and repel the poles on the Rotor. Sequentially changing the direction of current flow rotates the Rotor through magnetic attraction and repulsion.

B) Drive Strategy

The three Stepper Motors make use of different Run, Settle, and Hold voltage levels during operation which are regulated by the Electronics. A run level voltage is applied to the active halves of the coils to produce a strong magnetic field during operation. A settle level voltage is used as a transition voltage when one half of a coil is switched off and the other half switched on. The Carrier Motor also makes use of a third voltage level (Holding Voltage), when stationary, to keep the Carrier stable for printing. The Holding Voltage is drawn off the +18 VDC, and stays between +4 to +5 VDC.

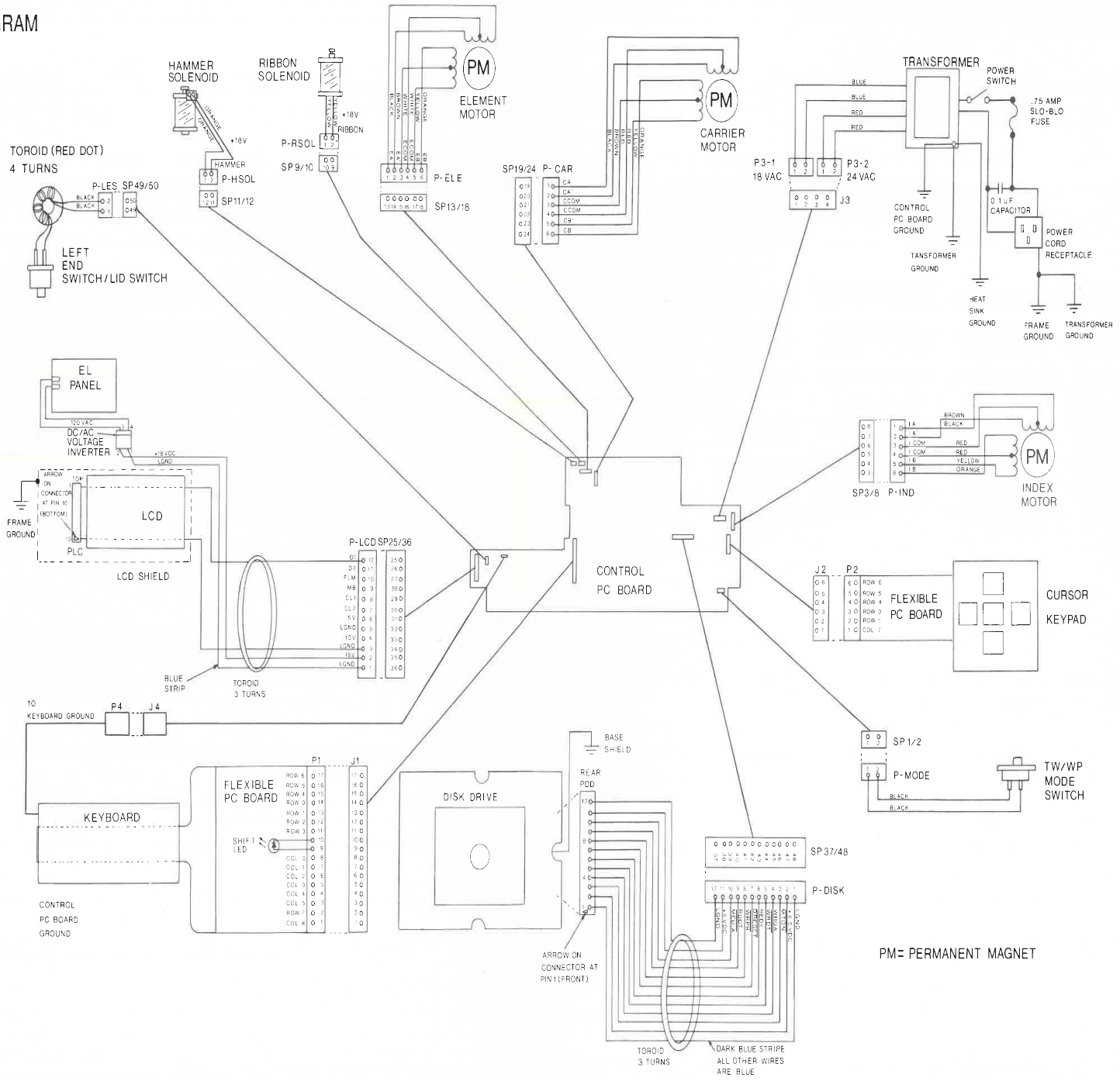
Operating Voltages

Motor	Run Voltage	Settle Voltage	Holding Voltage
Carrier	+18 VDC	+18 VDC	+5 VDC
Element	+18 VDC	+18 VDC	None
Index	+18 VDC	+18 VDC	None

As the Motor Phases change the lines of magnetic flux, the Permanent Magnet Rotor rotates through magnetic attraction and repulsion. The Electronics reverses the phase sequence for reverse Rotor rotation.

Note: The terms "Phase 1," "Phase 2," etc., are used for description purposes only. The actual starting phase for any motor move is dependent upon where the motor stopped in its previous move, and on the programming in the Electronics. All subsequent motor steps follow the normal sequence. The starting phase for the Carrier Motor is dependent upon the pitch selected and the actuation point of the Left End Switch.

WIRING DIAGRAM

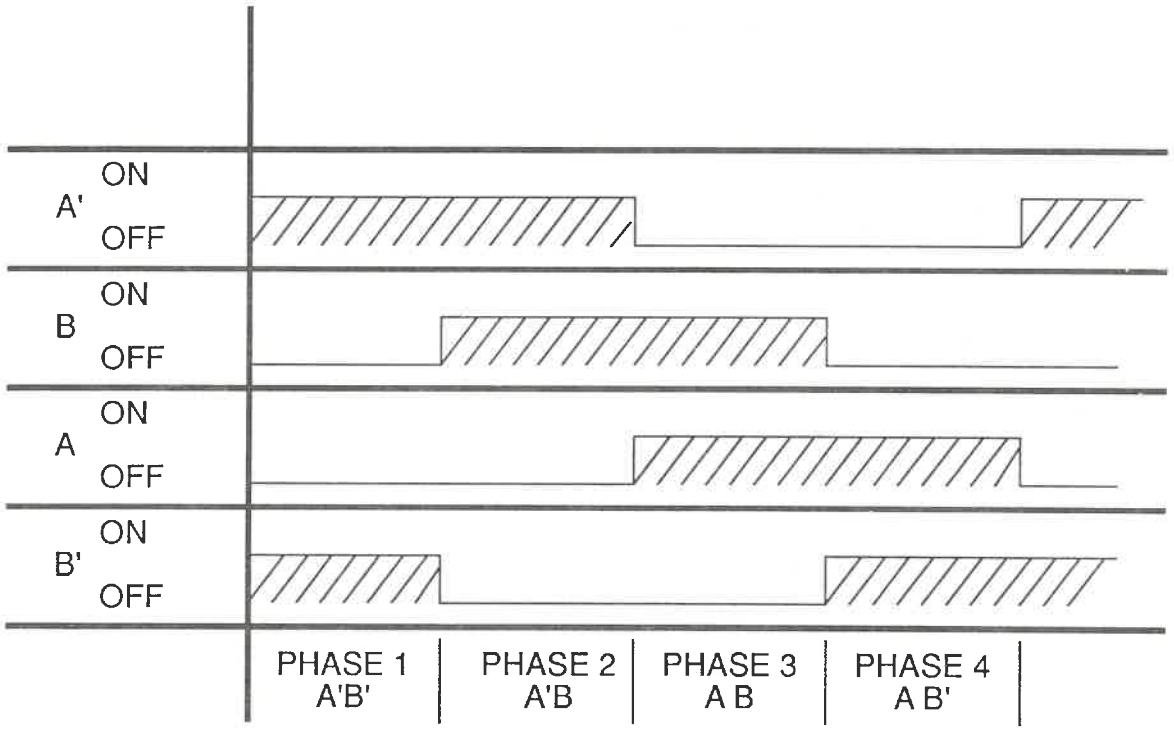


7) Stepper Motors (continued)

C) **Step Angles**

The Stator Teeth and magnetic Rotor Poles of each motor are arranged so that each successive Phase that is energized rotates the Rotor the same number of degrees. The step angle for all Motors is 7.5°, which means there are 48 full steps per revolution. The number of phases that are energized to perform any particular function is dependent on the nature of the function.

STEPPER MOTOR TIMING CHART



8) Carrier Drive

The Carrier Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Carrier Motor rotates clockwise and counterclockwise to move the Carrier left and right along the Carrier Rails for printing, correction, and spacing functions.

There is a 12 tooth Drive Gear permanently attached to the Carrier Motor Rotor Shaft. This Gear meshes with a one piece Carrier Drive Rack which mounts above the Carrier Drive Gear. The Carrier Drive Gear is under tension by a Spring and Anti-Backlash slider that pushes down on the Carrier Drive Rack. This spring tension reduces Gear backlash and maintains a constant mesh between the Carrier Drive Rack and Gear.

9) Element Drive

The Element Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Element Motor rotates clockwise and counterclockwise to place the desired character on the Print Element in line with the Hammer for printing and correction.

There is a 48 tooth Drive Gear permanently attached to the Element Rotor Shaft. This Drive Gear is in mesh with a 96 tooth, two piece Element Scissors Gear. The front half of the Element Scissors Gear is pressed onto the Element Drive Shaft, so that when the Element Motor rotates clockwise and counterclockwise the Element Drive Disc rotates also.

The Left End Switch Positioner is mounted on the rear cross frame of the Frame Assembly. During initialization, the Left End Switch Positioner tooth contacts the ridge on the Rear Scissors Gear. When the Element Motor rotates counterclockwise, the Positioner Tooth drops into the Notch in the Gear Ridge to stop the Element at Home Position.

The Element Drive Disc has two rectangular holes and one round hole which are keyed to fit the Print Element. When a Print Element is inserted, and the Hammer Assembly is pivoted rearward against the Element, the Element Pusher (mounted in the Hammer Solenoid Bracket) pushes the Element against the Drive Disc. During initialization, the Element rotates quickly clockwise to snap the Element onto the keyed holes in the Element Drive Disc under tension of the Element Pusher. The keyed holes assure that the Home Character (e) is at Print Position when the Positioner Tooth is engaged in the Notch on the Rear Scissors Gear.

Element Home Position is established during initialization. If a new Print Element is inserted after initialization, opening and closing the Lid reinitializes the machine to reestablish Home position.

The Electronics is programmed to select the shortest distance to the next printable character on the Element whether printing from the Buffer or starting at Home Position.

10) Print Hammer

The Print Hammer is pivotally attached to the Hammer Assembly Bracket, and rests on the Hammer Solenoid Plunger under spring tension. When the Electronics energizes the Hammer Solenoid for printing, the Solenoid Plunger moves upward to pivot the Hammer top rearward to strike the Print Element Petal in its path against the Platen. When the Hammer Solenoid is de-energized, the Hammer returns to rest under spring tension.

The Electronics is programmed to energize the Hammer Solenoid for longer or shorter periods of time to provide stronger or weaker impression for individual characters. For broad faced characters (W, M, etc.), the Electronics energizes the Solenoid for a longer period of time than for small faced characters (., _, etc.). There are various time periods programmed in the Electronics to provide equal impression among all characters in all pitches.

11) Cassette Ribbon Feed/Correction Ribbon Lift & Feed

The Cassette Ribbon Feed and Correction Ribbon Lift & Feed are both driven by the same mechanism. This mechanism has one solenoid which is energized every Cassette Ribbon or Correction Ribbon cycle. A latching system, controlled by the energizing of the Print Hammer Solenoid, triggers either a Cassette Ribbon Feed or a Correction Ribbon Lift and Feed. The normal position of this latch mechanism is Correction Ribbon Lift and Feed.

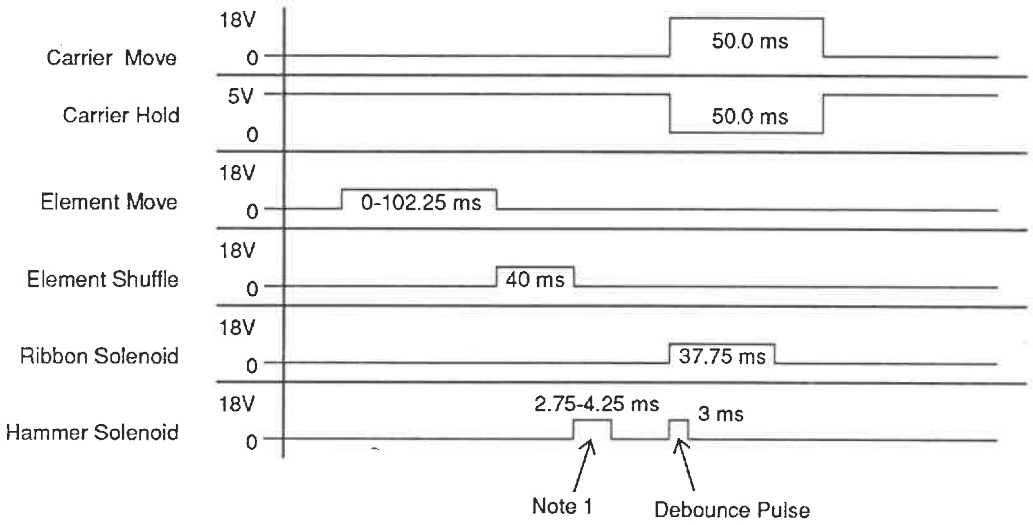
The Electronics determines from Keybutton depressed whether the feed should be Cassette Ribbon or Correction Ribbon. A brief sequence for each action follows:

A) **Cassette Ribbon** - the Element rotates to the selected character; the Hammer fires to print the character and trip the Ribbon mechanism for a Cassette Ribbon Feed; the Ribbon Solenoid energizes to feed the Cassette Ribbon; the Carrier moves right one space (see Print Cycle Chart below).

Notes: 1) When the Ribbon Solenoid is de-energized, the Ribbon mechanism returns to the Correction Ribbon Lift and Feed position.
2) The Ribbon advance during a Cassette Ribbon cycle is for the next printable character.

B) **Correction Ribbon Lift & Feed** - the Carrier moves left to the character location; the Element rotates to the selected character; the Ribbon Solenoid energizes to lift and feed the Correction Ribbon, and the Hammer fires to transfer the character to the Correction Ribbon. The Ribbon Solenoid de-energizes, allowing the Correction Bail to drop to its normal position and the Ribbon mechanism to the Correction Ribbon Lift and Feed position.

PRINT CYCLE -- SINGLE CHARACTER (10 PITCH)



NOTE 1:
LENGTH OF PULSE VARIES
WITH THE PITCH SELECTED
AND HAMMER ENERGY LEVEL.

12) Cassette Ribbon Feed Mechanism

When latched for Cassette Ribbon feed, the Cassette Ribbon Feed mechanism feeds Ribbon when the Ribbon Solenoid is energized. The top of the Ribbon Driver seats in the Drive Gear in the Ribbon Cassette. The bottom of the Ribbon Driver seats into the Ribbon Ratchet Hub which in turn fits over the Ribbon Feed Shaft. On the bottom of Ribbon Feed Shaft is an Anti-Backup Feed Spring which allows the Feed Shaft to rotate only in one direction.

After printing the previous character, the Ribbon Solenoid energizes and pulls the pawl of the Ribbon Feed Assembly in the teeth of the Ribbon Drive Ratchet Hub. This action rotates the Ribbon Feed Shaft, which rotates the Ribbon Driver approximately 30° for each printable character. The Cassette Ribbon is now positioned for the next printable character.

13) Correction Lift & Feed Mechanism

When the Ribbon mechanism is in its normal position, it is ready for a Correction Lift and Feed cycle. As the Ribbon Solenoid plunger is pulled into the Solenoid, the bottom of the Correction Bellcrank is pulled forward, moving the top tail upward, which causes the Correction Bail to lift upward. As the Bail raises, the Correction Feed Pawl ratchets over one tooth of the Correction Take-up Spool. When the Ribbon Solenoid Plunger is released, spring tension on the Bail returns all parts to rest. As the Bail lowers, the Feed Pawl engages a tooth in the Correction Take-up Spool to rotate the Take-up Spool one tooth past the Stop-Pawl to feed the Correction Ribbon.

14) Paper Feed

Driven by the Electronics, the Index Motor rotates clockwise and counterclockwise to drive the Platen for Paper Feed.

On the Index Motor is a 12 tooth Drive Gear that is permanently attached to the Index Motor Rotor Shaft. This Gear is in mesh with a Pinion Face Gear. The Pinion Face Gear has a smaller gear that meshes with a large gear of the Linespace Pinion Assembly. The Linespace Pinion Assembly has a small gear that is in mesh with the Gear surface of the Platen Knob Assembly. The Platen Knob is mechanically attached to the Platen. This series of gears provide the correct gear speed and torque to provide proper rotation of the platen.

When the Carrier Return Keybutton or Code function is depressed, the Electronics energizes the Index Motor to rotate the Platen the number of linespaces as determined by the operator's linespace selection (1, $1^1/_2$, or 2).

The Paper Release Lever holds the Paper Table so that Front and Rear Feed Rollers are against the bottom of the Platen to provide Paper Feed through friction when the Platen rotates. When the Paper Release Lever is pulled upward, the Paper Table drops slightly to remove the Feed Roller tension, which allows the operator to straighten a sheet of paper before printing.

SECTION 3

LUBRICATION & CLEANING

INDEX

Subject	Page Number
General Lubrication Procedure	3-1
Cleaning Procedures	3-2
Lubrication Points	3-3

GENERAL LUBRICATION PROCEDURE

The main illustration points for 5D Series Personal Word Processors are illustrated and listed beginning on page 3-3. Each lubrication point is indicated with an arrow and a circled reference number indicates the lubricant used at that point. The following lubricants are required:

Reference Number	Description	Part Number
1	Dow #200 Silicone	250254
2	VW-1222 Non-Fluid Oil	250299
3	Mobil FM2 Grease	250500
4	Anderol 465	250289
5	Dow #111 Silicone	250290
6	Never-Seez Grease	250293
7	NYOGEL	250262

Important: The following parts should be kept free of dirt, grease, and oil:

Control PC Board
Transformer
Disk Drive
LCD

CLEANING PROCEDURES

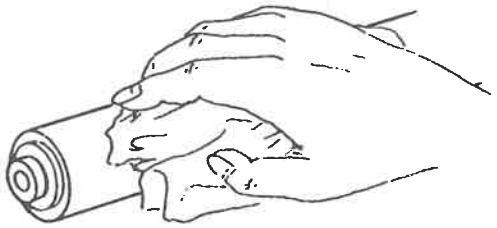
Cleaning procedures for machine parts and recommended cleaning solutions are outlined below.

Do not, under any circumstances, use an air hose or chemical cleaner to clean a Personal Word Processor. Debris and chemical residue can impair the function of electrical components. If an internal part requires cleaning, wipe that part clean with a clean, dry cloth.

Caution: When cleaning with recommended cleaning solutions, take care that no liquid drips or splashes onto internal parts. Keep all solvents and petroleum distillates away from electrical components.

Platen

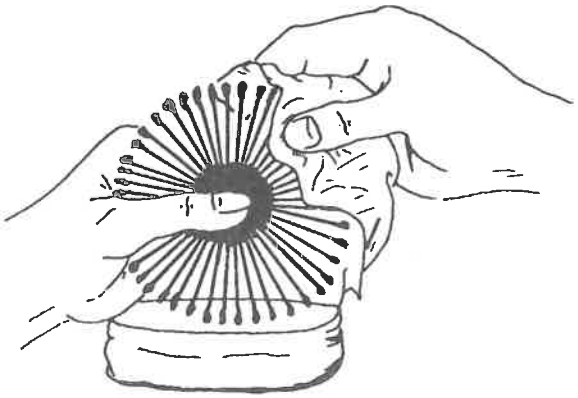
Remove Platen (see Removals). Soak a clean cloth with rubbing alcohol, and wipe the Platen surface to remove dust, dirt, and ink.



Note: If Platen is not removed, **do not** use alcohol. Use a household cleaner such as Windex.

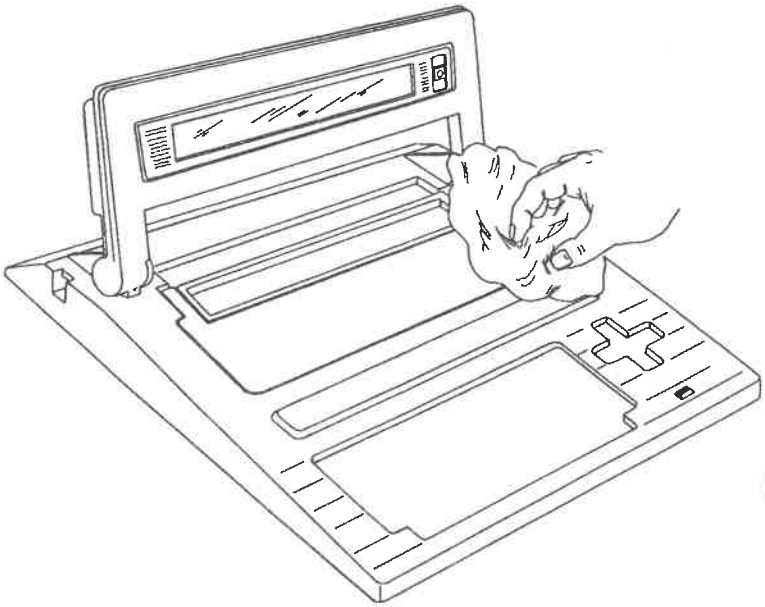
Print Element

Dip the Print Element Petals into a container of rubbing alcohol, and wipe dry with a clean cloth. **Do not** soak the Print Element in the alcohol.



Jackets

Remove Jackets and wipe clean with a sponge soaked in a mild ammonia or soap solution. **Do not** use any cleaning solutions which contain chlorinated compounds.

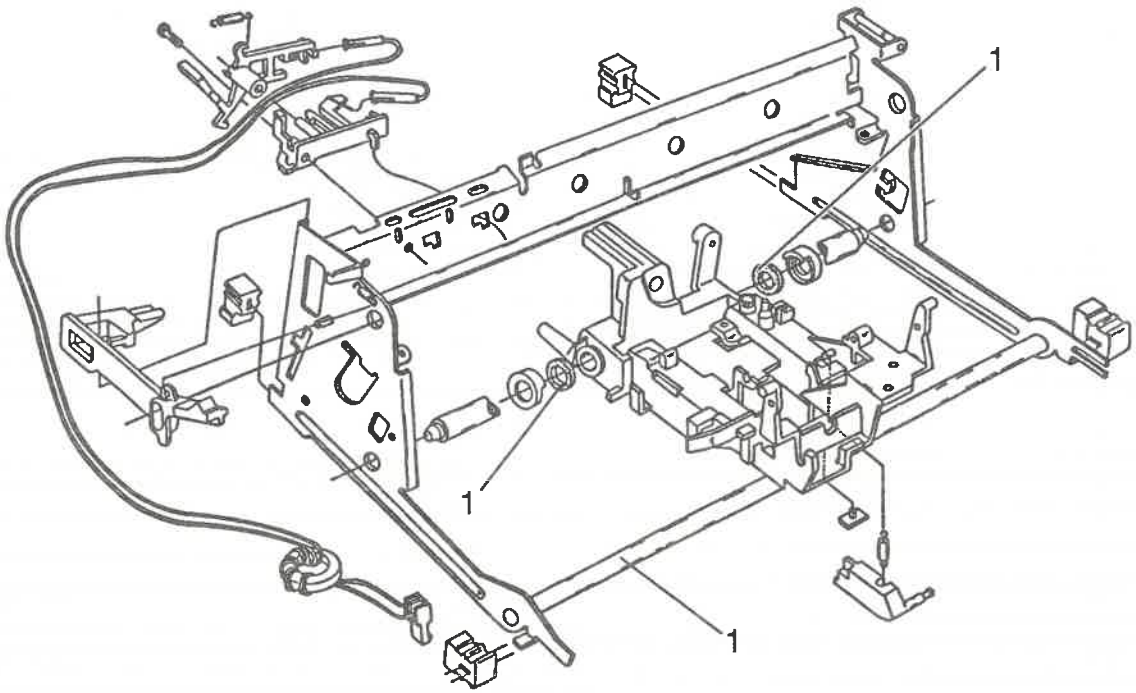


LCD

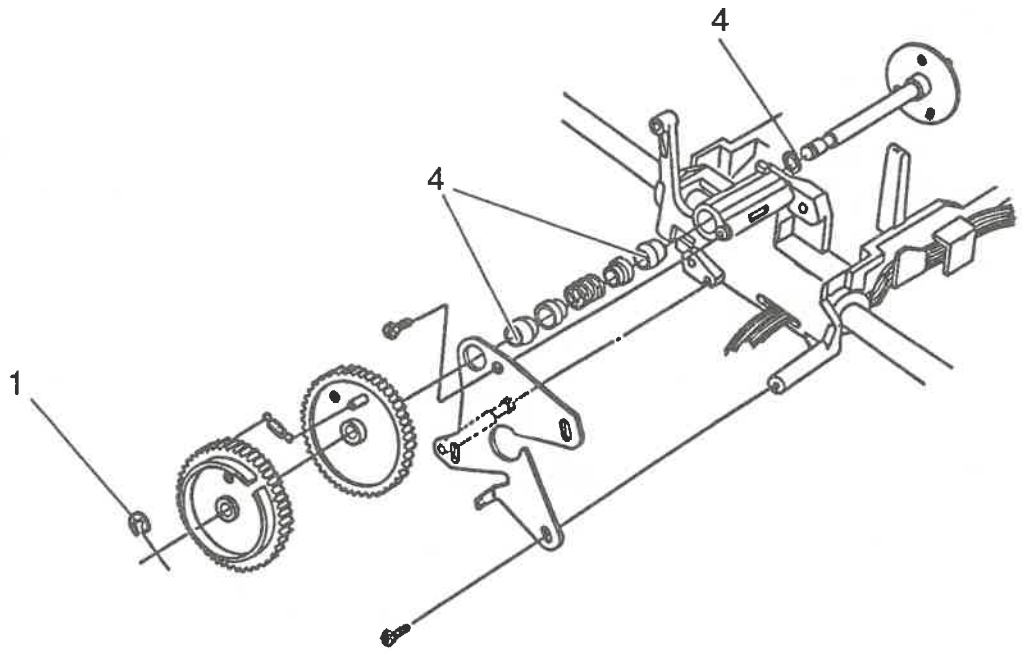
Use a soft camel hair artist's brush to remove dust. Use a soft dry cloth to remove smudges. **Do not** allow any liquid to come in contact with the LCD.

LUBRICATION POINTS

CARRIER RAILS



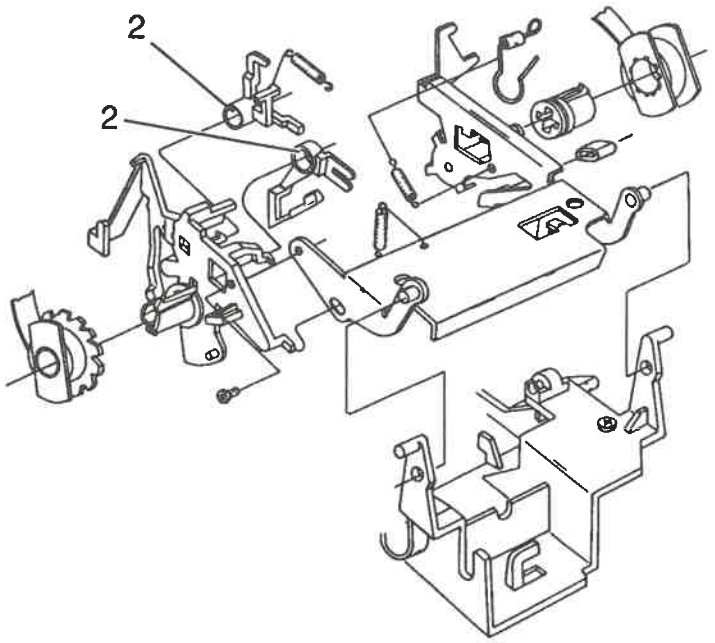
ELEMENT DRIVE



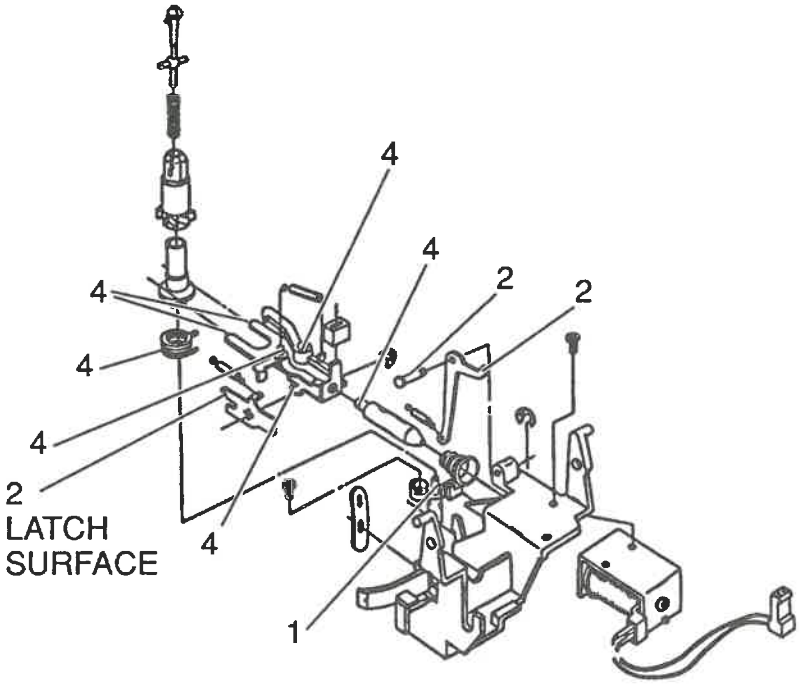
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

CORRECTION LIFT/FEED



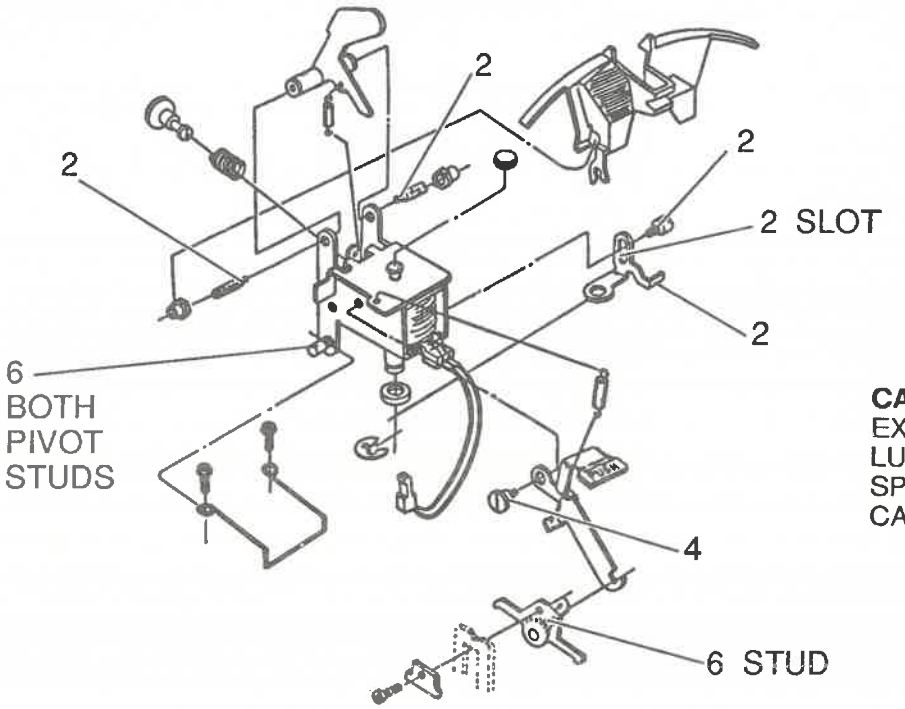
RIBBON DRIVE



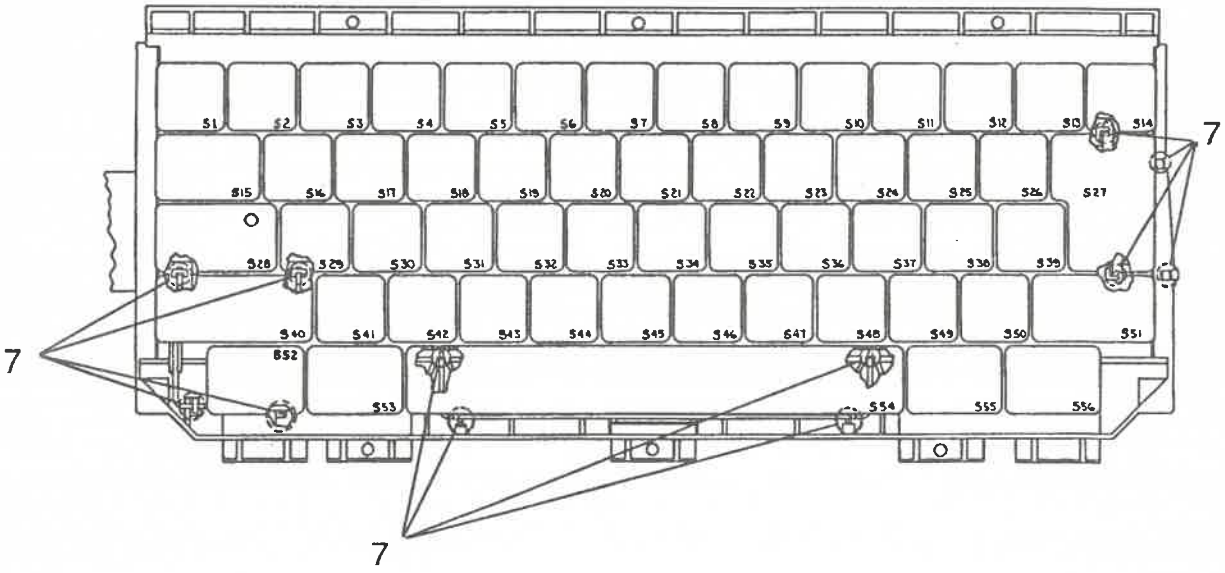
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

HAMMER



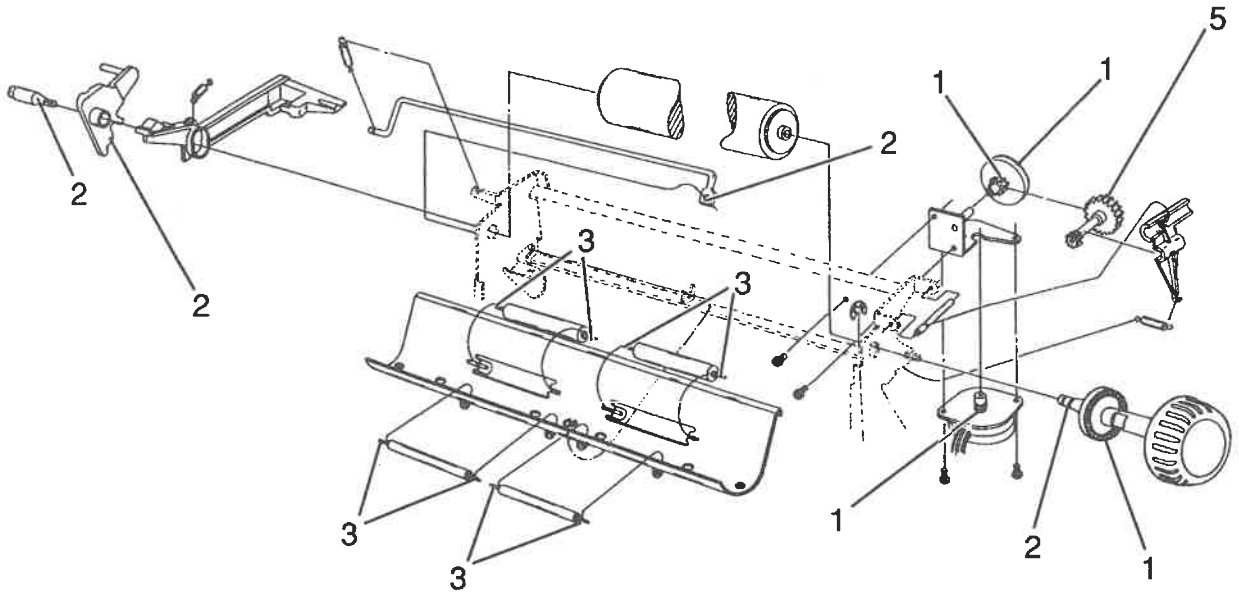
KEYBOARD



REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

PAPER FEED



REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

SECTION 4

REMOVALS

General Procedure: All removals should be performed with power cord unplugged and machine at rest. Prior removal of particular groups of parts is indicated in each removal procedure as required.

When adjustments are broken during a removal, those adjustments are indicated at the bottom of the procedure, and are referenced to adjustment numbers in the Adjustment Section. Refer to the Branch Display on page 5-1 for sequential relationships among adjustments.

OBSERVE STATIC PRECAUTIONS

Removals of PC Boards and other static sensitive parts are marked as above. Be extremely careful when handling these parts as static electricity can cause irreparable damage to static sensitive devices. Refer to the reverse side of the Contents Page (page ii) for proper procedures to follow when handling static sensitive devices.

Removals Index

	Page Number
1. Mask/LCD Removal	4-3
2. Keyboard and Cursor Keypad Removal	4-4
3. Cursor Keybutton Removal	4-5
4. Keyboard Component Removals	4-6 & 4-7
5. LCD and LCD Housing Removal	4-8 & 4-9
6. LCD Housing Brake Assembly Removal	4-8 & 4-9
7. Control PC Board Removal	4-10
8. Disk Drive Removal	4-10
9. Frame Assembly Removal (with Carrier & Paper Handling)	4-11
10. Power Supply Removal	4-12
11. Correction Bail Removal	4-13
12. Correction/Cassette Ribbon Solenoid Removal	4-13
13. Ribbon Mechanism Removal	4-14
14. Hammer Solenoid Assembly Removal	4-15
15. Element Motor Removal	4-15
16. Element Drive Shaft and Bearings Removal	4-16
17. Platen and Paper Table Removal	4-17
18. Index Motor Removal	4-17
19. Carrier Motor and Carrier Rack Drive Assembly Removal	4-18
20. Carrier Molding Removal	4-19

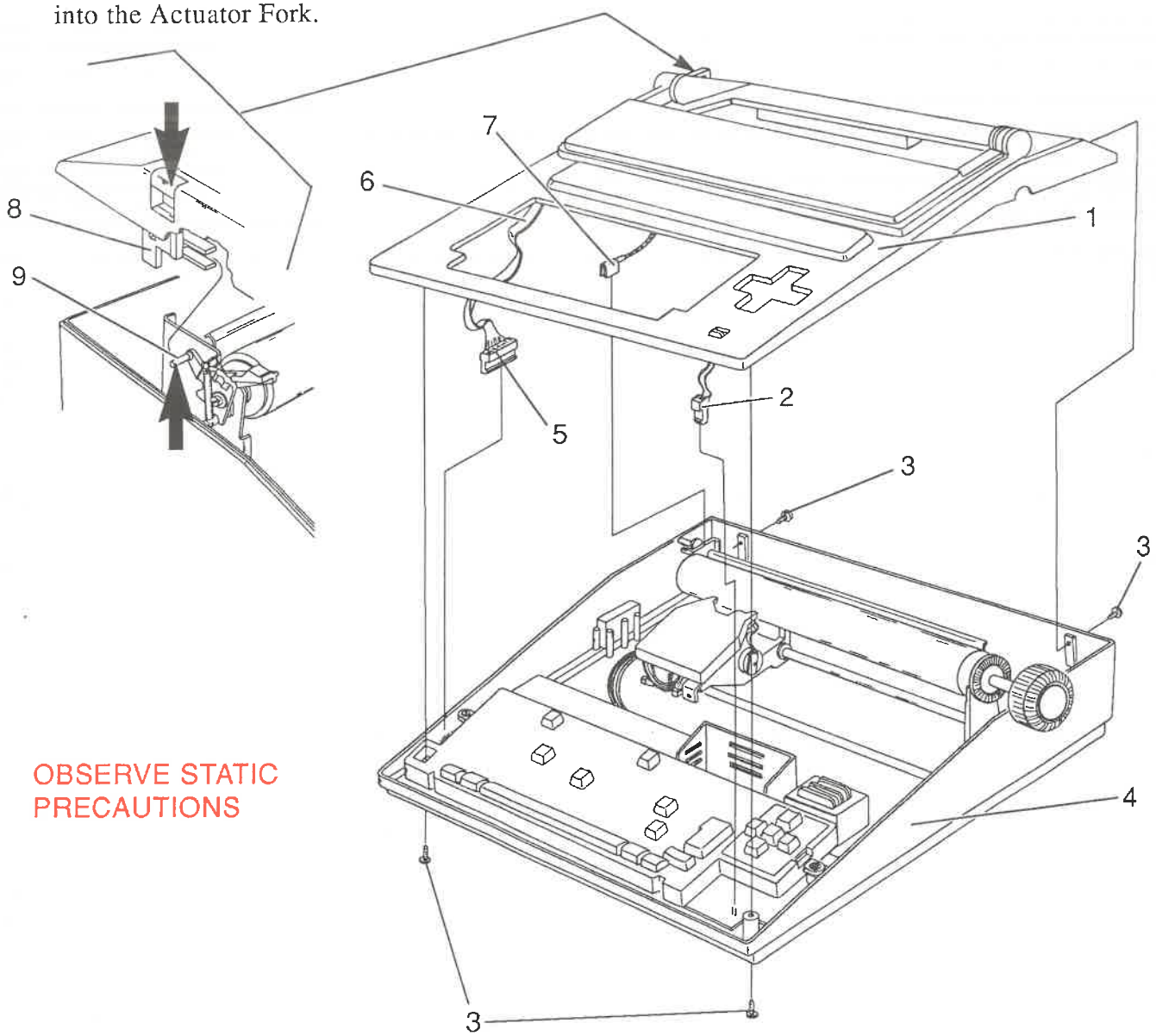
1. Mask/LCD Assembly Removal

1) Remove four Screws (3).
2) Lift right side of Mask (1) slightly and disconnect Mode Switch Connector (2) from Control PC Board.
3) Raise left front of Mask and remove LCD Connector (5) from Control PC Board.
4) Move Mask (1) upward and rearward to disengage Paper Release Lever (9) from Paper Release Actuator.(8). See insert.
5) Pivot right side of Mask Assembly off to the left. Disconnect the LCD Ground Wire (7) from Frame Assembly. Lift LCD Cable (6) from Casing Base and lift off Mask.

Note 1: Deck and Paper Bail can be unsnapped from Mask.

Note 2: To remove Casing Base (4), remove Keyboard Frame Assembly, Frame, Control PC Board, Disk Drive, and Power Supply (see Removals Index).

Replacement: Reverse procedure. Note: Before replacing Mask (1), push Paper Release Actuator (8) down and lift Paper Release Lever (9) up to assure easy alignment of the Lever Stud into the Actuator Fork.



OBSERVE STATIC PRECAUTIONS

2. Keyboard and Cursor Keypad Removal

1) Remove Mask/LCD Assembly (see Mask/LCD Assembly Removal).

2) Remove two Screws (3).

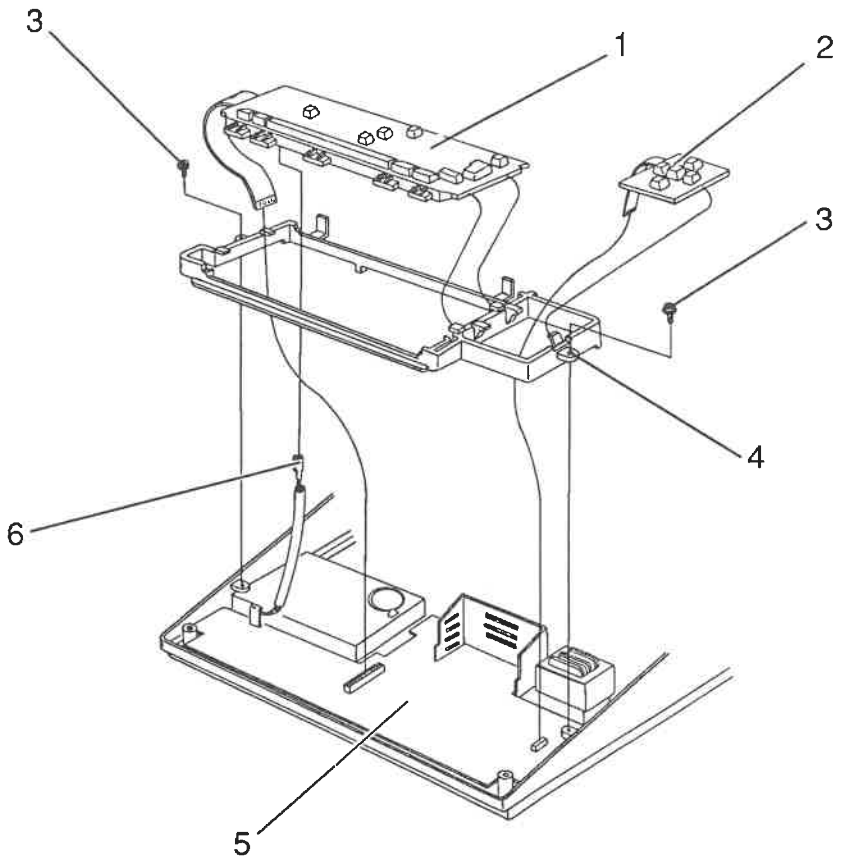
3) Disconnect Keyboard Flexible Cable and Cursor Flexible Cable Connectors from Control PC Board (5). Disconnect Ground Cable (6) from Keyboard (1). Lift out Keyboard Frame Assembly (4).

4) To remove Cursor Keypad (2), disconnect Cursor Keypad Connector from Control PC Board, spread Keyboard Frame and lift out Keypad.

5) To remove Keyboard (1), disconnect Keyboard Connector, spread right side of Keyboard Frame, and lift out Keyboard.

Replacement: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.

OBSERVE STATIC PRECAUTIONS



3. Cursor Keybutton Removal

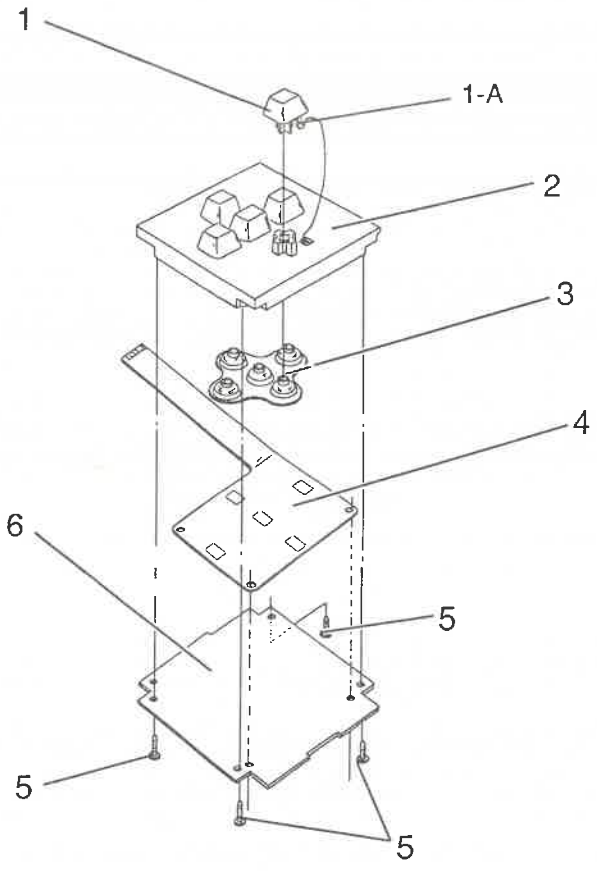
1) Remove Mask/LCD Assembly and Keypad.

2) With Keypad upside down, (Keybuttons facing down), remove Screws (5) and lift off Keypad Metal Plate (6).

3) Lift off Keypad Flexible PC Board (4) and Molded Dome Switches (3) from Keypad Housing (2).

4) To remove Keybutton (1), depress Keybutton Tab (1-A) and lift up Keybutton (1) from the top of Keypad.

Replacement: Reverse procedure. Align three alignment holes in Keypad Flexible PC Board (4) and Metal Plate (6) with three pins on Keypad Housing (2).



4. Keyboard Component Removal

1) Remove Mask/LCD Assembly and Keyboard (see Removals Index).
2) With Keyboard upside down (Keybuttons facing down), remove Screws (4) and lift off Keyboard Metal Plate (3).
3) Lift off Keyboard Flexible Circuit (2) and Molded Switches (1) from Keyboard.

Important: Prying up on a Keybutton damages the Striker Spring. If a Striker Spring gets damaged, the entire Keyboard must be replaced.

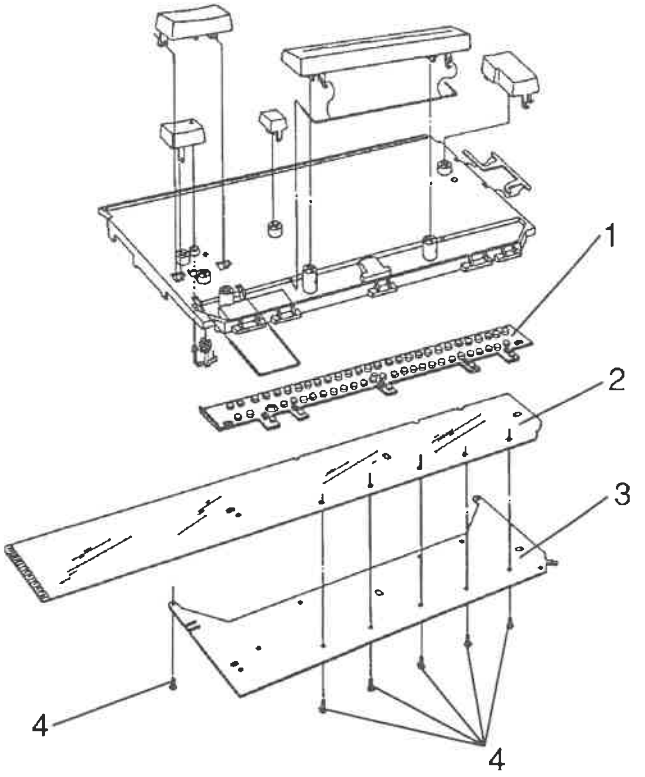
4) Keybutton Removals: The Keybuttons on the Keyboard **cannot** be removed by prying up the Keybutton. Refer to the following procedure.

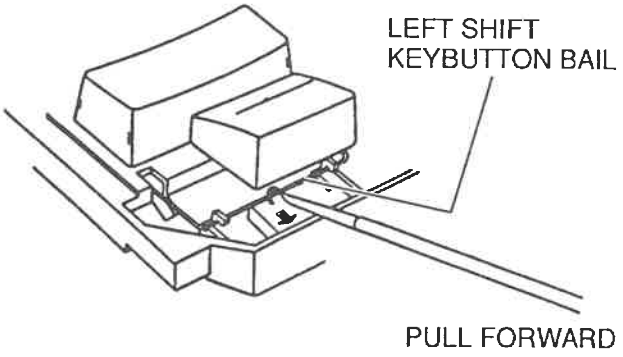
   A. Remove the Keyboard from the Keyboard Frame. Removal of the Keyboard Base Plate is not necessary, but the illustrations in this procedure show it removed.

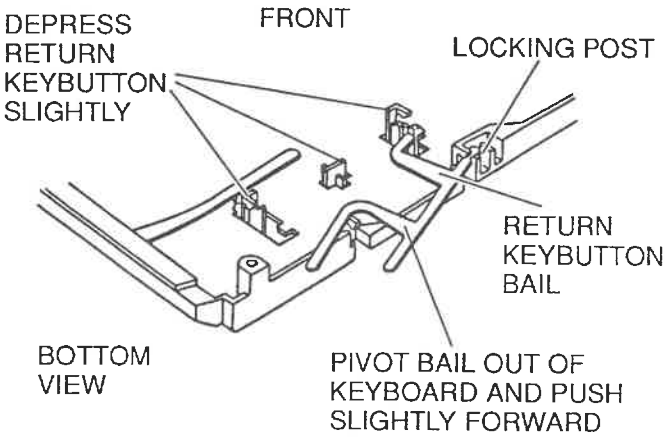
   B. When removing the Spacebar, Left Shift, or Return Keybutton, remove the Keybutton Bail first:

      1) For the Spacebar or Shift Keybutton,use a Spring Hook on the Wire Bail, and pull forward to disengage the Bail from the Keyboard and Keybutton.

      2) For the Return Keybutton, depress the Keybutton slightly, push gently forward on the Sheet Metal Bail, and pivot the Bail out of the Keyboard. ***Be careful not to damage the Locking Post when pushing the Bail forward.***

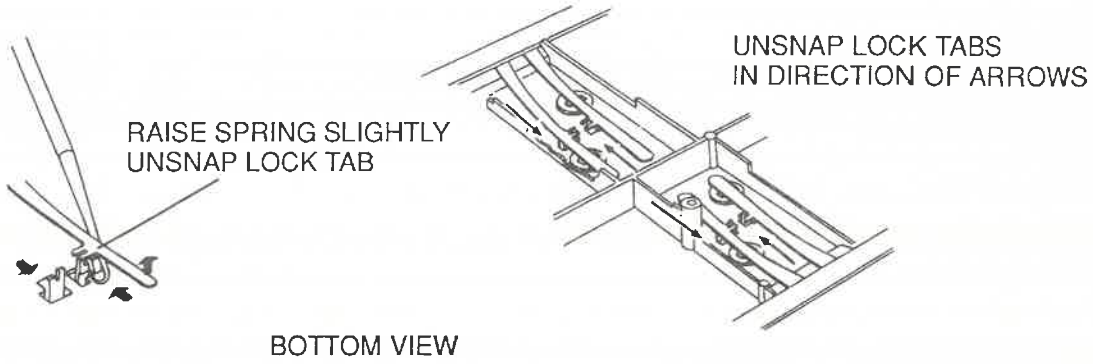






4. Keyboard Component Removals (continued)

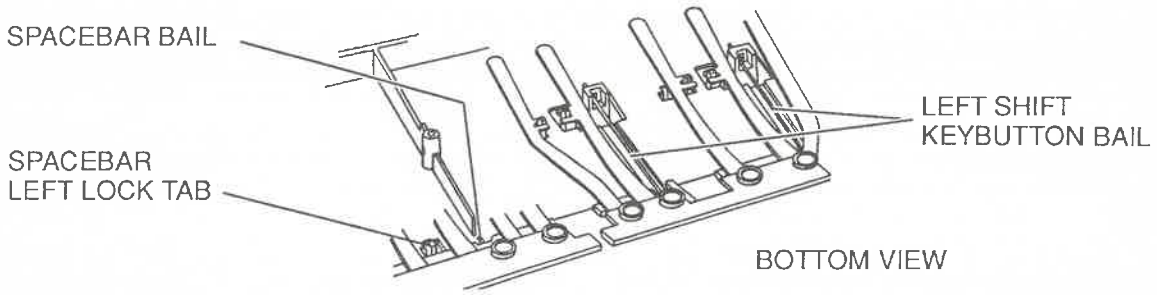
C. Turn the Keyboard upside down, and use a Spring Hook to raise the Striker Spring slightly to disengage it from the Keybutton. ***Caution: Do not raise the Striker Spring too far or the Spring will get damaged.*** While holding the Spring away from the Keybutton, use the Spring Hook to unsnap the Keybutton Lock Tab from the Keyboard. The Keybutton drops out of the Keyboard Assembly. Note: The Spacebar has two Lock Tabs.



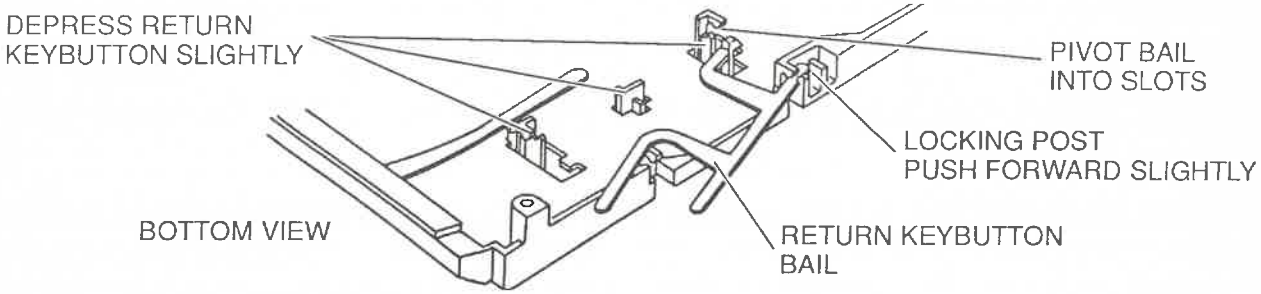
Replacement:

1. Align the Keybutton with the holes in the Keyboard, and snap the Keybutton in place.

2. a) When replacing the Spacebar or Left Shift Key Wire Bail, insert the Bail through the holes in the Keyboard. Make sure the ends of the Bail are properly aligned, and snap the front of the Bail into its locking tabs.



b) When replacing the Return Keybutton Sheet Metal Bail, depress the Keybutton slightly; gently push the end of the Bail slightly against the Keyboard post, and pivot the Bail into position. Make sure the Arms of the Bail seat in the Slots on the Keybutton.



c) Replace the Keyboard in the Keyboard Frame.

5. LCD and LCD Housing Removal

1) Remove Mask/LCD Assembly from Casing Base (See Mask/LCD Removal)
2) Remove Screw (5) and Washer (6) from the underside of the Mask. Then remove the Toroid (7) and LCD Cable from Stud (8).
3) Disconnect LCD Ground Cable (9) from left side frame. Then unhook LCD Cable (10) and LCD Ground Cable (9) from the Cable Restraint (11) on the Mask
4) Wedge a Flat Tip Screwdriver between the Left Mask LCD Support (21) and the Left Lower LCD Housing (22). Slightly twist the screwdriver and snap the LCD Housing from the Mask. Use the same procedure to snap the Right LCD Housing free from the Mask.
5) Remove two Plugs (13) and two Screws (14).
6) Press down on the Upper LCD Housing (12) and move it rearward to unsnap it from the Lower LCD Housing (22).
7) Disconnect the LCD Connector (19) from the LCD and the Inverter (4) from the EL Panel.
8) Remove six Screws (15) from the LCD, and remove the LCD Ground Cable (9) and Ground Shield (16) from the LCD.
9) Lift the LCD (18) from the Lower LCD Housing (22) and slide the EL Panel (17) free of the LCD. Note: To remove the Plastic Slide (20) for the Contrast Control, lift up on top of Slide so it clears the stop and move the slide upward until it stops. Slide (20) will fall clear of Lower LCD Housing.

To remove the LCD Cable Assembly (10) from the Mask:

10) Unwrap the three winds of the LCD Cable from the Toroid (7) and remove Toroid.
11) Feed the LCD Cable Assembly through the top side of the Mask.

Replacement: Reverse procedure. When reassembling the LCD in the Lower LCD Housing, be sure that the LCD contrast control actuator seats in the forks of the Plastic Slide (20) of the Lower LCD Housing. Mark the LCD Cable 12 3/4" from the 12 pin MTA Connector and make three non-overlapping wraps of the LCD Cable around the Toroid. Also, make sure that all cabling is properly routed. Be sure EL Panel SLOT (1) seats on Post (2) and Inverter (4) with Foam Pad (27) rest in Inverter Well (3).

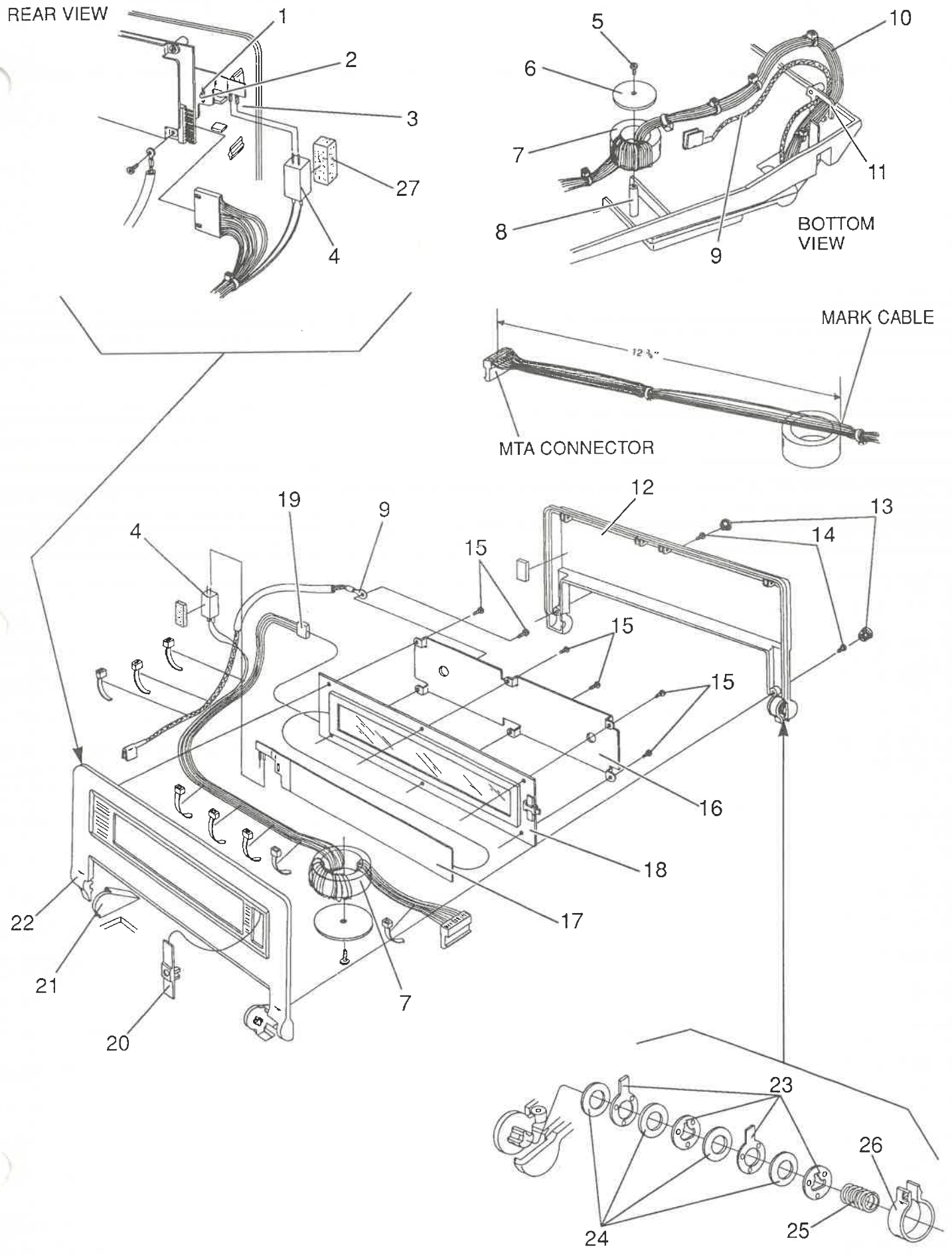
6. LCD Housing Brake Assembly Removal

With upper LCD Housing flat on work surface, rotate Brake Assembly so it is 90 degrees to upper LCD Housing.

1) Spread Brake Collar (26) and remove from right side of Upper LCD Housing (12).
2) Compress Spring (25) and remove from LCD Housing.
3) Remove Disks (23) and Pads (24) from right side of Upper LCD Housing

Replacement: Proper reassembly is necessary for correct braking action.

A) Install the Disks and Pads in the sequence illustrated. Note: Mold marks in the Plastic Disks should all face in the same direction.
B) Compress and install Spring (25).
C) Install Brake Collar (26) with tapered corners facing out.


REAR VIEW
1
2
3
27
4
5
6
7
8
9
10
11
BOTTOM VIEW
MARK CABLE
12 3/4"
MTA CONNECTOR
19
9
4
15
12
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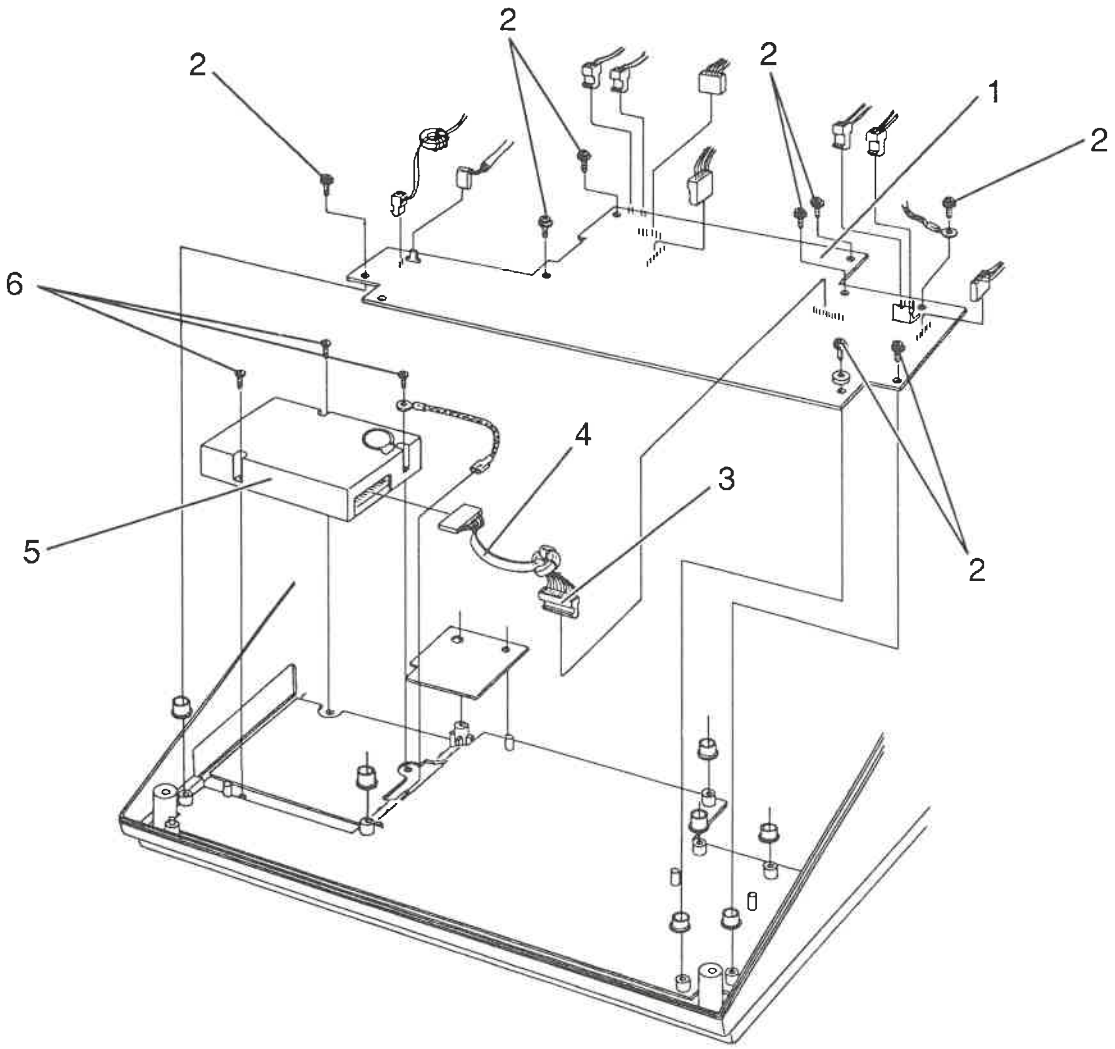
7. Control PC Board Removal

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Disconnect all Connectors from Control PC Board (1).
3) Remove Screws (2), free Ground Cables, and lift out Control PC Board (1).

Replacement: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.

OBSERVE STATIC PRECAUTIONS



8. Disk Drive Removal

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Disconnect Disk Drive Cable Connector (3) from Control PC Board (1).
3) Remove three Screws (6), free Disk Drive Ground Cable, and lift out Disk Drive (5). Disk Drive Cable (4) can now be unplugged from Disk Drive.

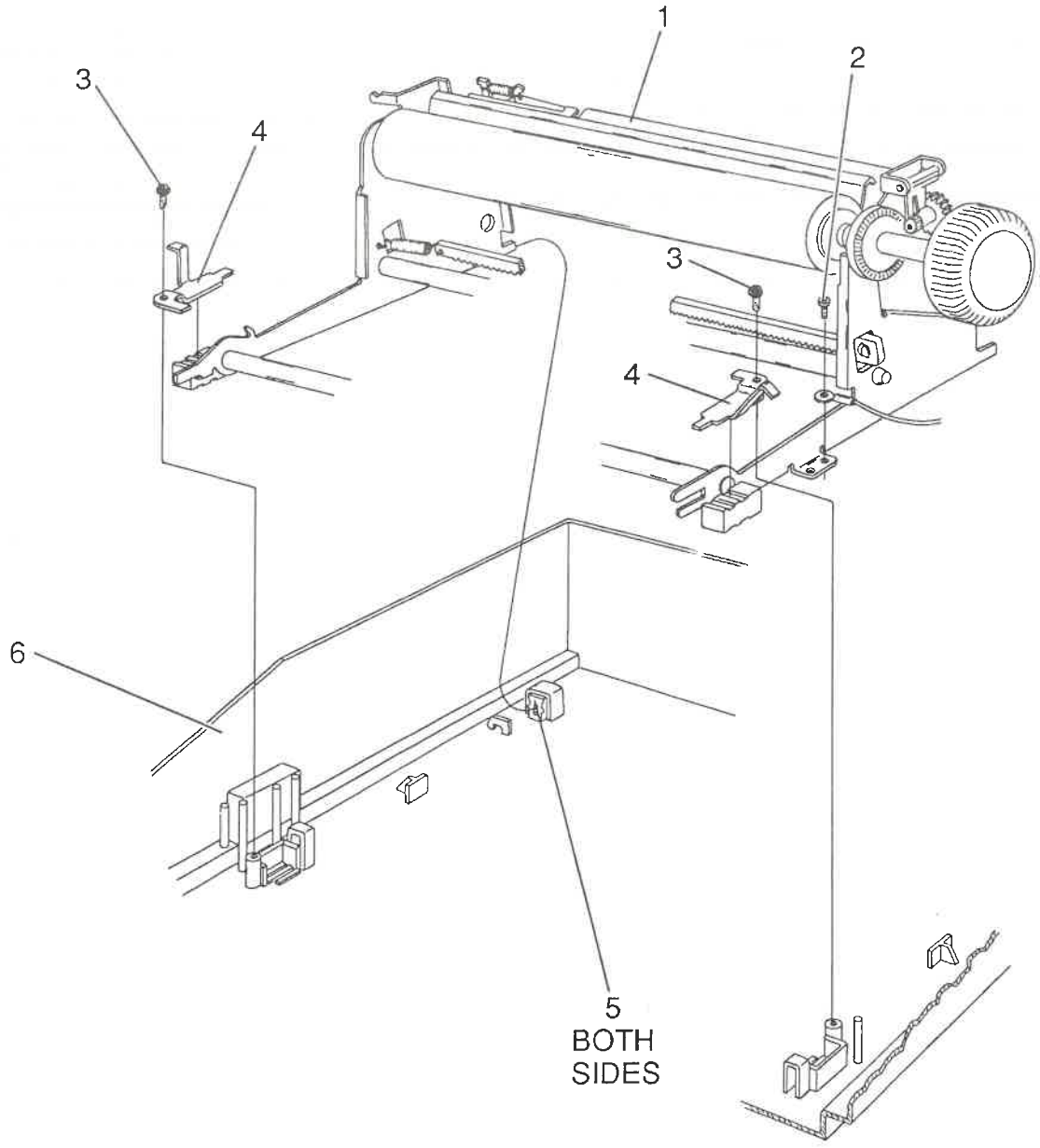
Replacement: Reverse procedure.

9. Frame Assembly Removal (with Carrier & Paper Handling)

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Remove two Screws (3) and two Foot Retainers (4) from Casing Base.
3) Remove Frame Ground Screw (2) and Ground Wire from Frame.
4) Disconnect Left End Switch Connector from Control PC Board and unhook wires from Retainer in Casing Base.
5) Disconnect all Motor and Solenoid Connectors from Control PC Board.
6) Free Spiral Harness and Component Wires from Casing Base.
7) Lift Frame Assembly (1) out of Casing Base (6). Note: This requires some force since the fit is tight. The two rear Feet (5) of the Frames will remain in the Casing Base.

Replacement: Reverse procedure.

OBSERVE STATIC PRECAUTIONS



10. Power Supply Removal

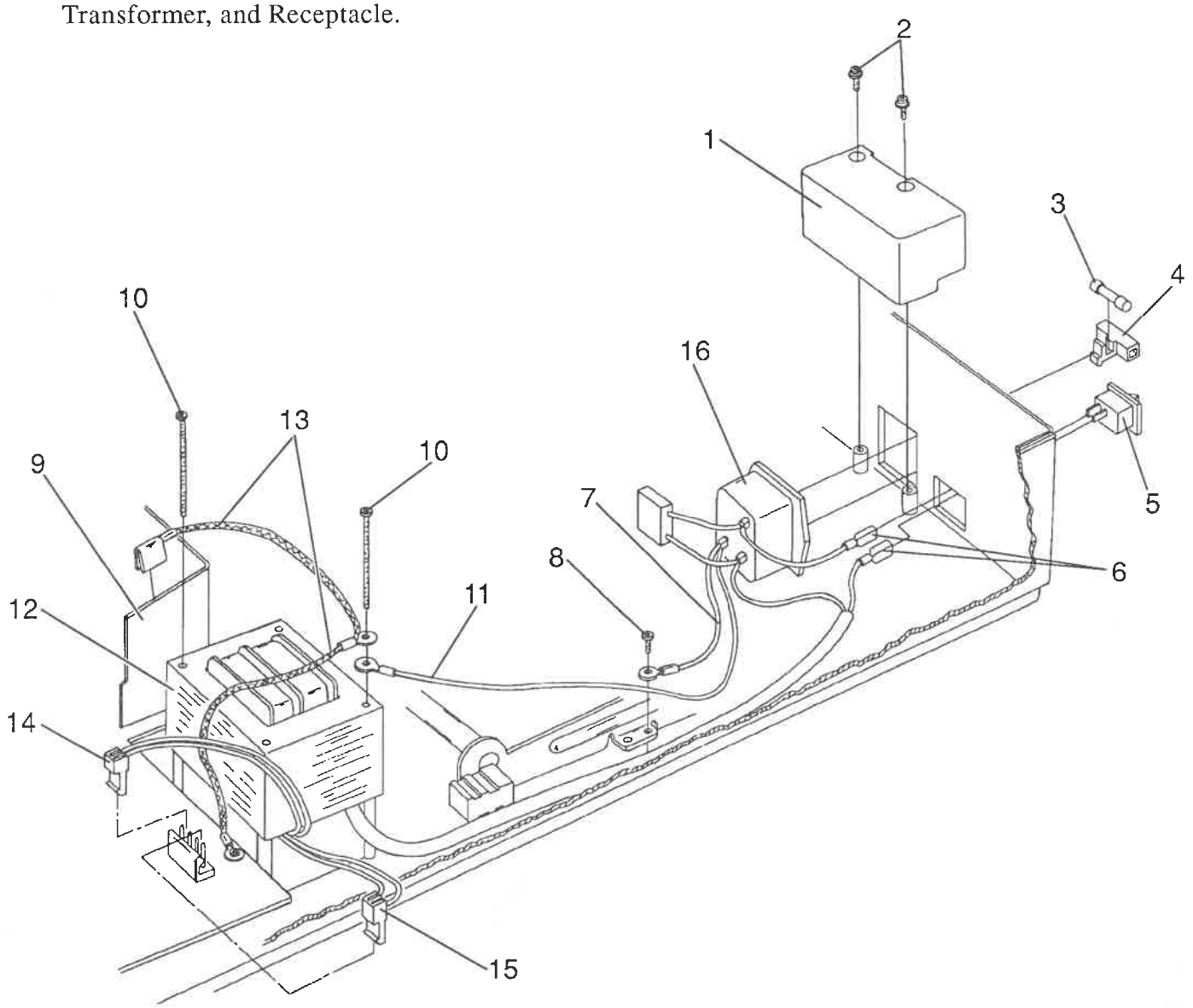
Fuse Removal:

1) Snap out Fuse Holder (4) and remove Fuse (3).

Transformer & Receptacle Assembly Removal:

1) Remove Mask/LCD Assembly (see Removals Index).
2) Remove two Cover Screws (2) and lift off Power Supply Cover (1).
3) Disconnect Switch Connectors (6) from Off-On Switch (5).
4) Remove Screw (8) to free Ground Wire (7).
5) Disconnect Connectors (14) & (15) from Control PC Board.
6) Remove two Transformer Screws (10).
7) Remove Ground Wire (13) from Transformer (12) and Control PC Board Heat Sink (9). Also remove Ground Wire (11).
8) Lift out Transformer (12) and Receptacle (16).

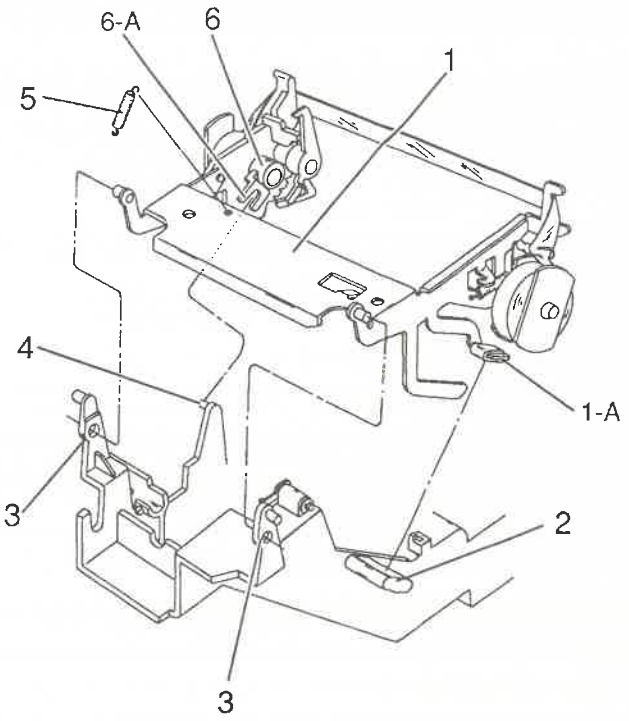
Replacement: Reverse procedure. Note: Power Supply parts are keyed to Guide Studs and Slots in the Casing Base. Refer to Wiring Diagrams for Connections to Control PC Board, Transformer, and Receptacle.



11. Correction Bail Removal

1) Remove Print Element and Ribbon Cassette. Correction Ribbon may be left in place.
2) Unhook Spring (5) from Correction Bail.
3) Remove Correction Bail from Carrier by pushing out on Ribbon Cassette Pivot Mounts (3). Note: Correction Feed Arm (6) may drop off.

Replacement: Reverse procedure. Note: Make sure Fork (6-A) of Correction Feed Arm engages Stud (4), and that Downstop Tail (1-A) is on top of Bail Downstop (2) on Carrier.

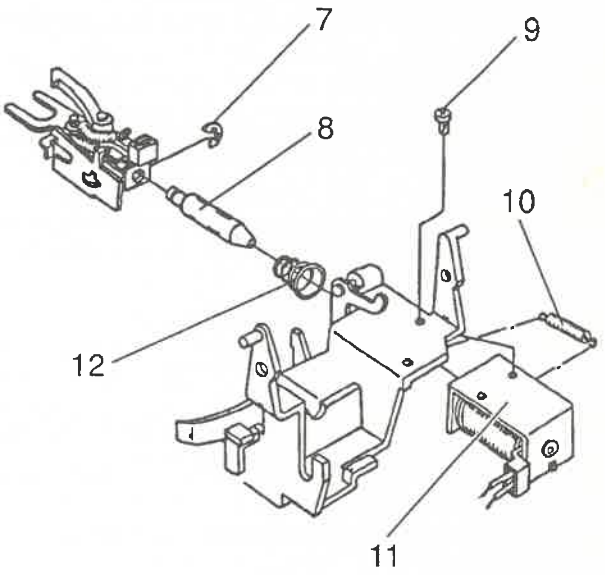


12. Correction/Cassette Ribbon Solenoid Removal

1) Remove Frame Assembly and Correction Bail (see Removals Index).
2) Unhook Spring (10) from Ribbon Solenoid (11).
3) Remove Screw (9) and lift out Solenoid.
4) Remove E-Ring (7) from Solenoid Plunger. Lift out Plunger (8) and Spring (12).

Replacement: Reverse procedure. Note: Make sure Solenoid Spring (12) is installed as shown in illustration, and that Spring (10) is in "V" Slot of Ribbon Solenoid.

Adjustments Broken: Correction Ribbon Lift Adjustment (Adjustment #6).



13. Ribbon Mechanism Removal

Note: Ribbon Driver (1) may be removed from Ribbon Driver Assembly with no other removals by pulling it straight up out of Assembly with a pair of Needle Nose Pliers. Spring (2) may fall free. Use Needle Nose Pliers to replace Ribbon Driver (1).

1. Remove Frame Assembly, Correction Bail, and Correction/Cassette Ribbon Solenoid (see Removals Index).

2. Remove Screw (10), E-Ring (8), Stud (6), and Correction Lift Bellcrank (7).

3. Lift out Ribbon Shaft Assembly from Carrier Molding (9).

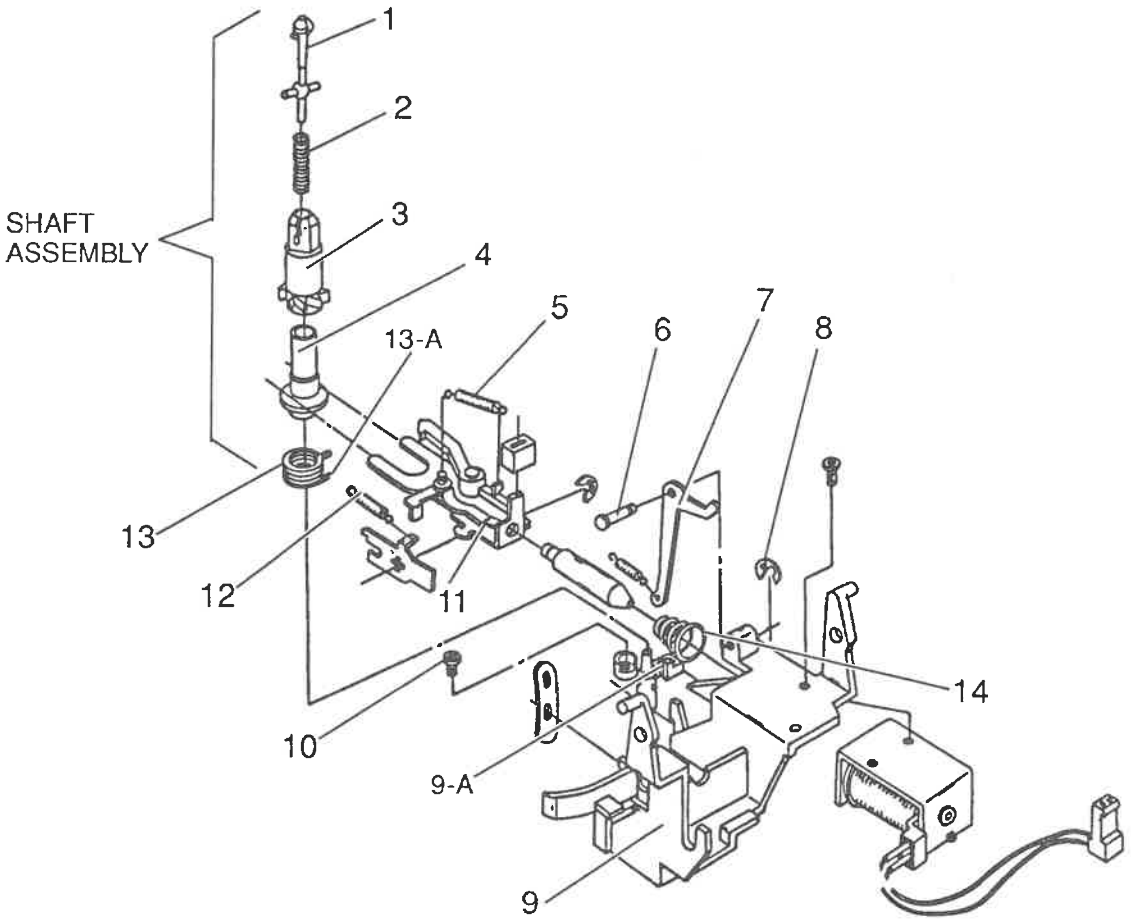
4. Remove Ribbon Drive Ratchet Hub (3) from Ribbon Feed Shaft (4) by pulling apart.

5. Remove Anti-Backup Feed Spring (13) from Ribbon Feed Shaft (4).

6. Remove Ribbon Feed Spring (5) and Black Latch Spring (12) from Ribbon Feed Assembly (11).

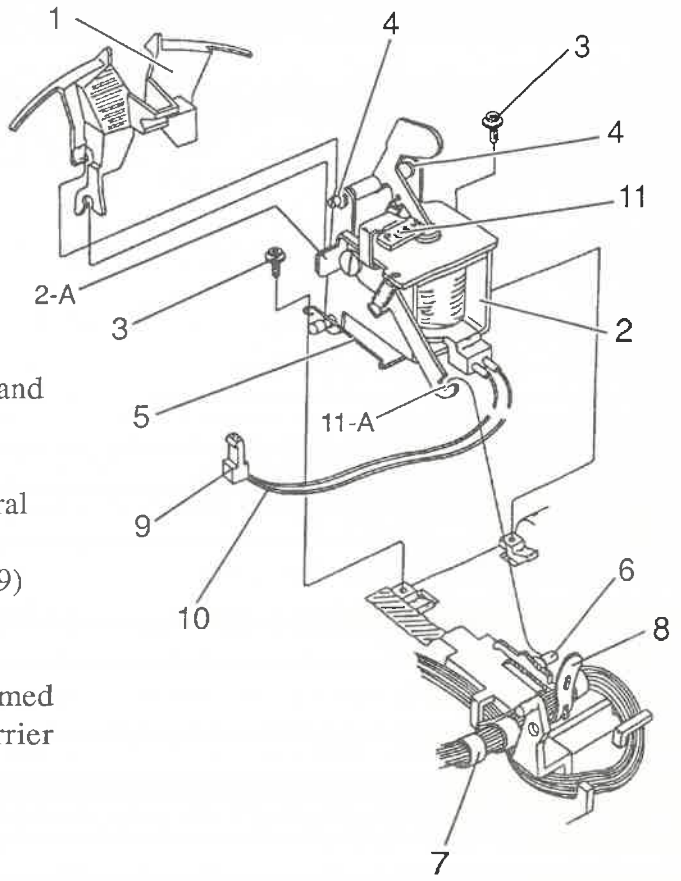
Replacement: Reverse procedure. Note: Spring Tab (13-A) seats in molded Notch (9-A) in Carrier Molding (9). Also, make sure Solenoid Spring (14) is installed as shown in illustration.

Adjustments Broken: Correction Ribbon Lift Adjustment (Adjustment #6).



14. Hammer Solenoid Assembly Removal

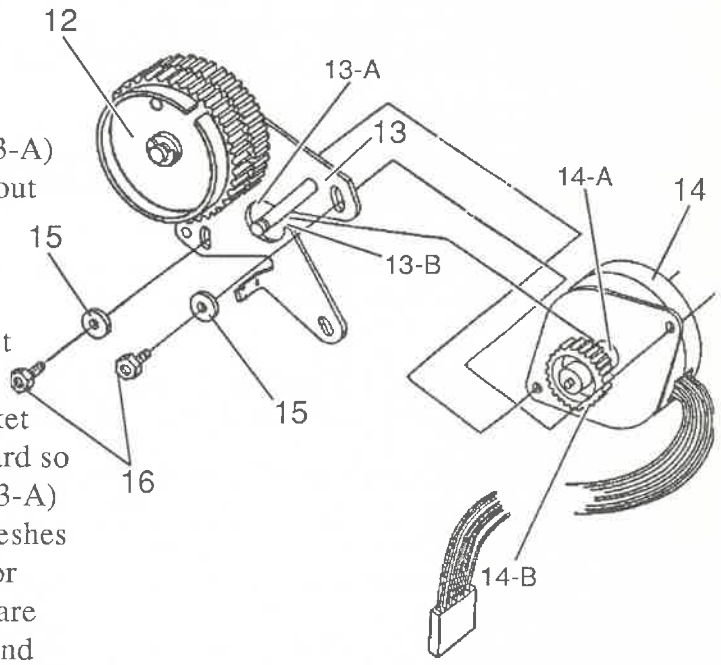
1) Remove Correction Bail (see Removals Index).
2) Remove Ribbon Guide (1) from Hammer Pivot Nuts (4) and Ear (2-A).
3) Unhook Wire Strap (8) from Carrier.
4) Remove two Screws (3) and Retaining Wire (5).
5) Press Push Lever (11) downward slightly, and lift Hammer Solenoid Assembly (2) out of Carrier.
6) Remove two Hammer Wires (10) from spiral Wire Binder Retainer (7).
7) Disconnect Hammer Solenoid Connector (9) from Control PC Board.



Replacement: Reverse procedure. Note: Formed area of Retaining Wire fits under Lip of Carrier Molding, and Stud (6) fits in Slot (11-A).

15. Element Motor Removal

1) Remove Frame Assembly (see Frame Assembly Removal).
2) Remove two Screws (16) and two Washers (15).
3) Push Element Motor (14) forward to disengage Bearing (14-A) from Hole (13-A) in Motor Bracket (13), and slide Motor out through Slot (13-B).



Replacement:

A) Wind Element Scissor Gears (12) against spring tension and hold Gears.
B) Slide Element Motor (14) through Bracket Slot (13-B), and push Motor (14) rearward so Bearing (14-A) seats in Bracket Hole (13-A) while making sure Drive Gear (14-B) meshes with Scissor Gears (12). Release Scissor Gears after Bearing is seated and Gears are meshed. Hold Element Motor in place and reinstall two Washers (15) and two Screws (16).

Adjustments Broken: Element Motor Position (Adjustment #1).

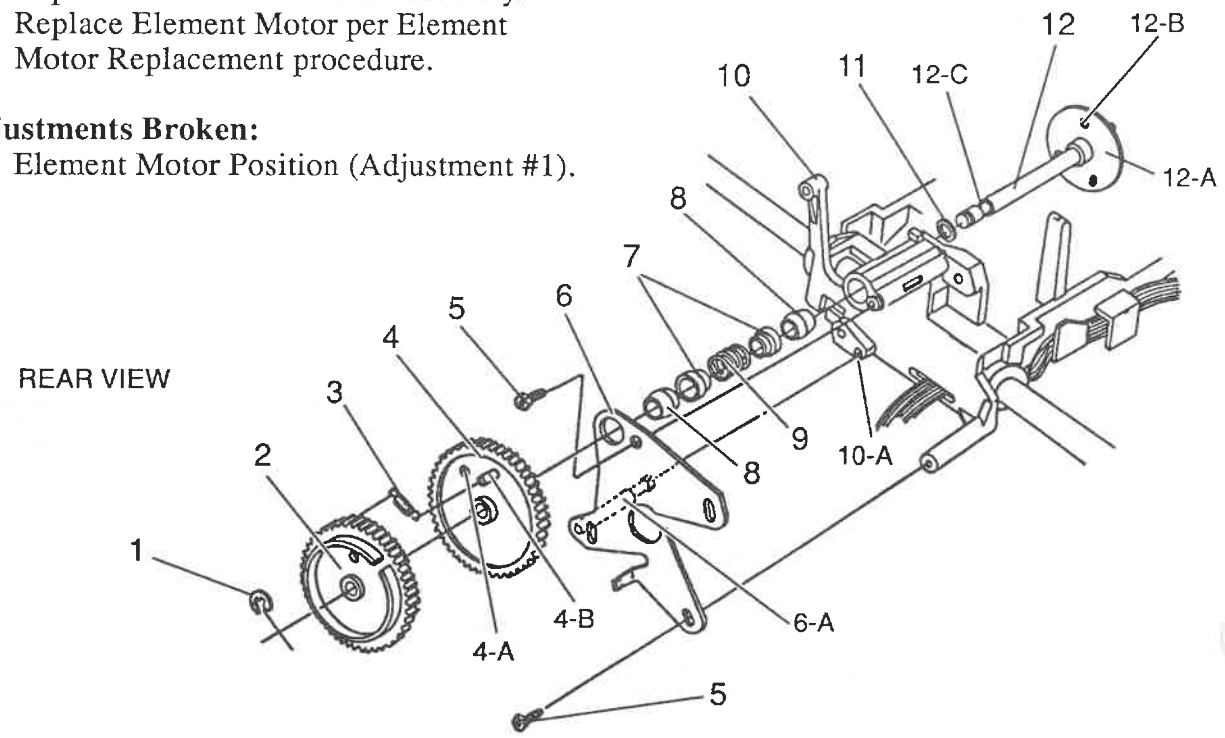
16. Element Drive Shaft and Bearings Removal

1. Remove Element Motor and Hammer Solenoid Assembly (see Removals Index).
2. Remove E-Ring (1), Outer Scissor Gear (2), and Spring (3).
3. Pry off Inner Scissor Gear (4). Note: This Gear must be replaced with a new one after prying it off.
4. Remove two Screws (5).
5. Pivot Stud (6-A) out of Slot (10-A) in Carrier Molding (10), and remove Bracket (6), Bearing Retainers (7), Bearings (8), Spring (9), Washer (11), and Element Drive Shaft Assembly (12). ***Caution: Carefully remove Bracket (6) to overcome Spring (9) tension.***

Replacement:

A) Insert Element Drive Shaft (12) with Washer (11) through Drive Shaft Hole in Carrier Molding (10).
B) Reassemble Bearings (8), Spring (9), Bearing Retainers (7), and Bracket (6) on Drive Shaft. Note: Smaller diameter of Bearings (8) fit into Retainers (7). Shoulder End of Retainers (7) seats in Spring (9).
C) Replace two Screws (5).
D) Rotate Drive Disc (12-A) so that Round Hole (12-B) is at 12 o'clock position. Hold new Inner Scissor Gear (4) with Hole (4-A) at about 11 o'clock position as viewed from the rear (arrow molded inside gear should be parallel with the Rear Frame crosspiece), and press Gear onto Drive Shaft until it bottoms on Drive Shaft Shoulder (12-C). Note: This positioning assures that Element Motor will be within adjustment range when reassembled.
E) Assemble Spring (3) to Inner Gear Spring Anchor (4-B) with other Spring Loop facing Hole (4-A). Place Outer Gear (2) on Shaft (12), hook Spring Loop with Outer Gear Spring Anchor, and twist Gears until Spring Anchors fit in Gear Holes: Assemble E-Ring (1).
F) Replace Hammer Solenoid Assembly.
G) Replace Element Motor per Element Motor Replacement procedure.

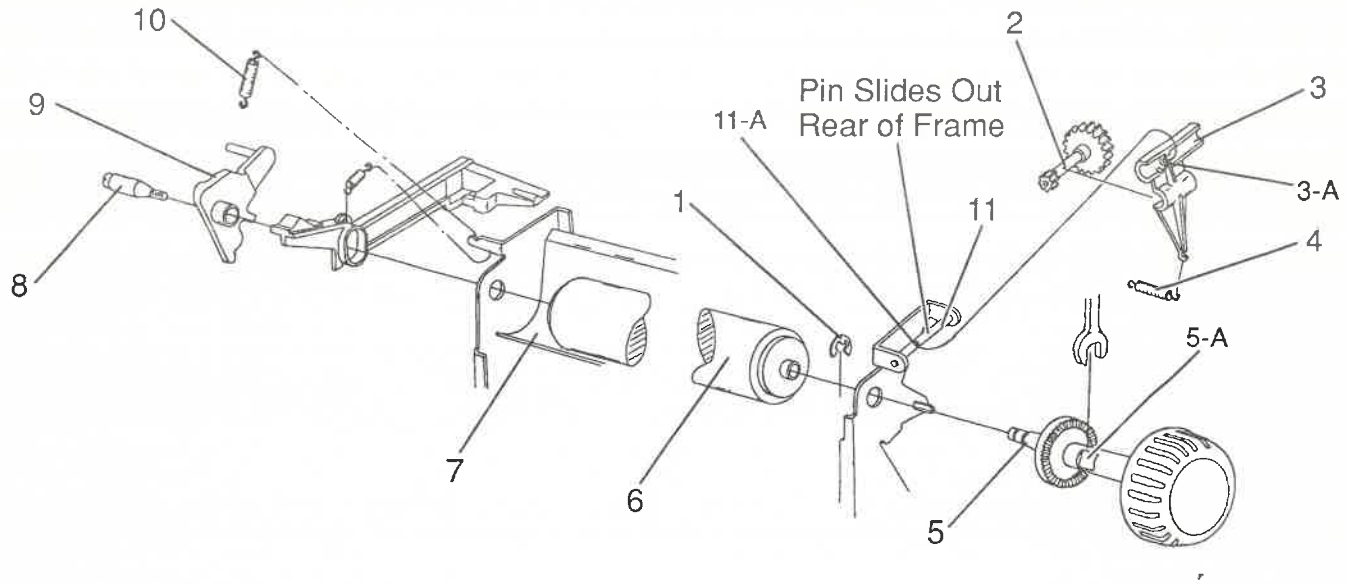
Adjustments Broken:
Element Motor Position (Adjustment #1).



17. Platen and Paper Table Removal

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Unhook Spring (4) from Linespace Pinion Pivot (3). Remove Pivot (3) and Linespace Pinion Assembly (2). Note: Pin (11) may fall free.
3) Unhook Spring (10) and remove Paper Release Lever (9).
4) Remove E-Ring (1).
5) Hold Platen Knob Shaft (5) with a 3/8" wrench over square portion of Knob Shaft (5-A) and remove Screw (8). Note: If you hold the Platen Knob, it will likely break when loosening Screw (8).
6) Hold Platen (6) and unscrew Platen Knob Shaft (5).
7) Lift out Platen (6) and Paper Table (7).

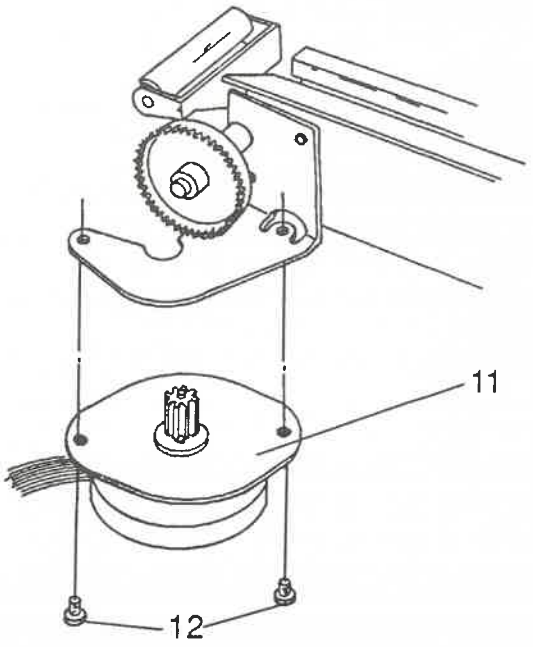
Replacement: Reverse procedure. Note: Formed Tab in Paper Table seats in Hole in Paper Release Shaft, and Flange (3-A) in Pinion Pivot seats in Groove (11-A) of Pin.



18. Index Motor Removal

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Remove Screws (12) and lift out Index Motor (11).

Replacement: Reverse procedure. Note: Make sure Motor Gear meshes with Intermediate Gear.

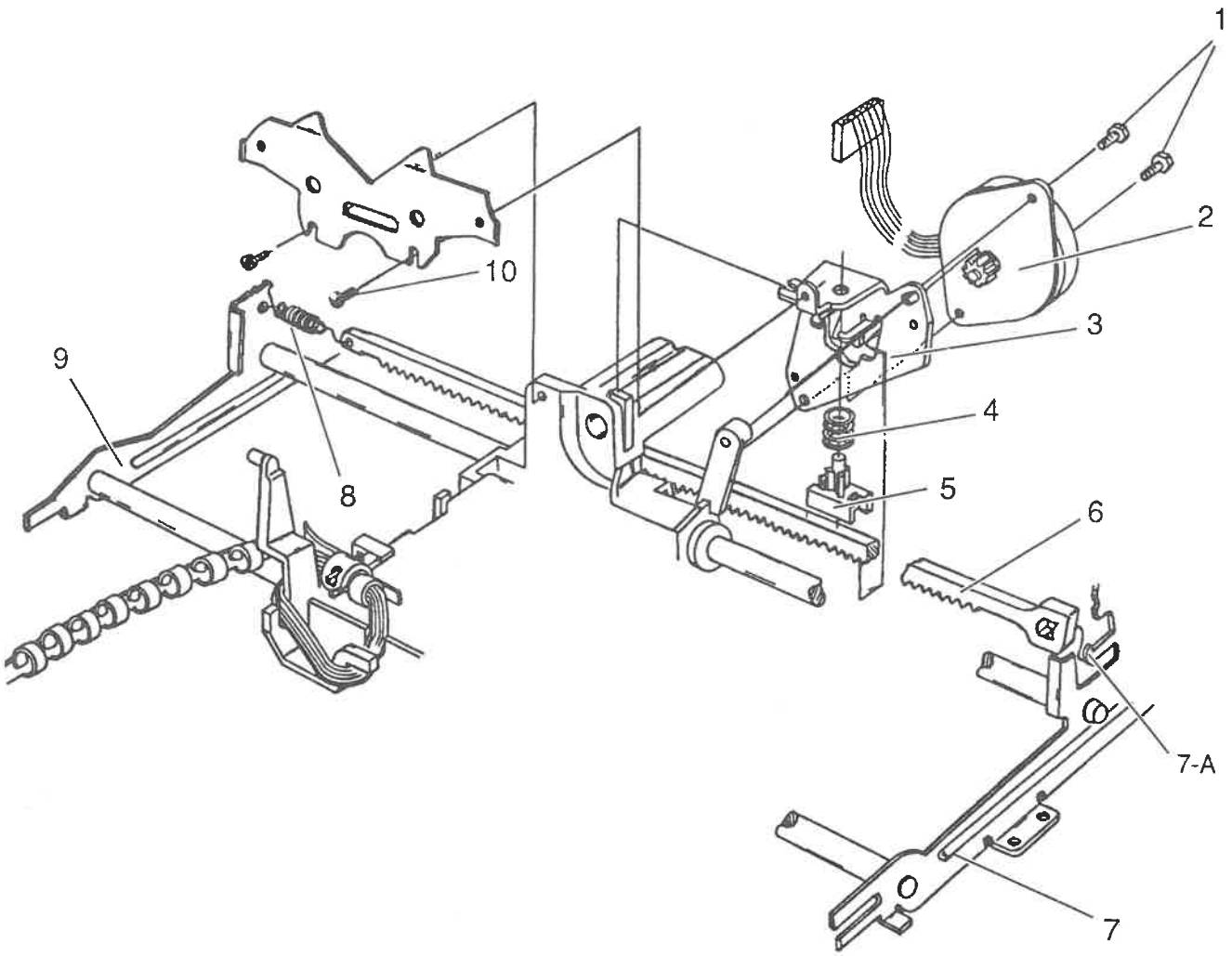


19. Carrier Motor and Carrier Rack Drive Assembly Removal

1. Remove Frame Assembly with Carrier Molding (see Removals Index).
2. Remove right Line Indicator Screw (10).
3. Remove two Screws (1).
4. Unhook Spring (8) from left Side Frame (9).
5. Remove Carrier Drive Rack (6) from Tab (7-A) on Right Frame, and lift out Carrier Return Bracket (3) and Carrier Motor (2). Remove Carrier Motor from Bracket.
6. Remove Slider (5) and Spring (4) from Carrier Return Bracket (3).

Replacement: Reverse Procedure.

Adjustments Broken: Line Indicator Position (Adjustment #7).

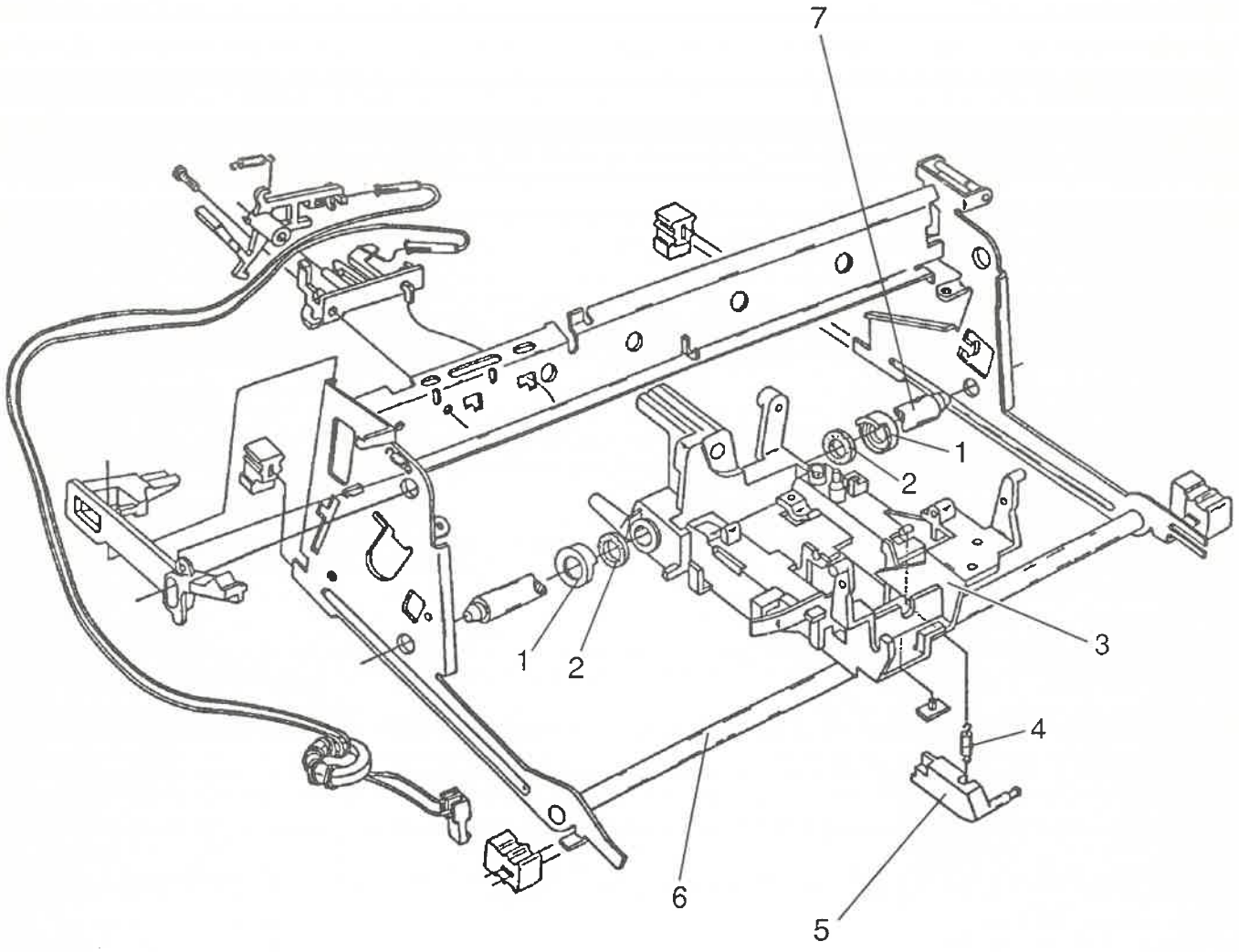


20. Carrier Molding Removal

1) Remove Frame Assembly, Rack Drive, Platen, and Paper Table (see Removals Index).
2) Spread Frames to disengage Rear Rail (7) from Frames.
3) Disengage Carrier Molding (3) from Front Rail (6), and slide Rear Rail (7) out of Carrier Molding.
4) Snap off two Felt Retainers (1), and remove two Felts (2).
5) Unhook Restraint Spring (4) from Carrier Molding (3) and remove Carrier Restraint (5).

Replacement: To replace Carrier Molding, remove all components from Molding (see Removals Index). Reverse procedures.

Adjustments Broken: 1, 3, & 7.



SECTION 5

ADJUSTMENTS

Adjustment Sequence Branch Display	Adjustment	Page Number
1 ↓ 2	1. Element Motor Position	5-2
	2. Hammer Center Position	5-3
3 ↓ 4	3. Hammer Assembly Position	5-4
	4. Ribbon Guide Position	5-4
5	5. Cassette Ribbon Position	5-5
6	6. Correction Ribbon Lift	5-5
7	7. Line Indicator Position	5-6
8	8. Line Indicator Clearance from Platen	5-6

General Adjustment Procedure:

Mask removal is required for access to most checks and adjustments. Additional access requirements are noted when applicable. All adjustments should be checked with Power Cord unplugged unless otherwise specified.

Circled reference numbers (i.e. (5)) in the illustrations indicate adjustment points.

The **Branch Display** above shows the relationships among adjustments. The arrow (⟶) means "*affects.*"

Example:

1
↓
2

Read this display as follows: 1 affects 2; 2 affects no other adjustment; 2 depends on 1 being correct.

Energizing Element Motor for Adjustments

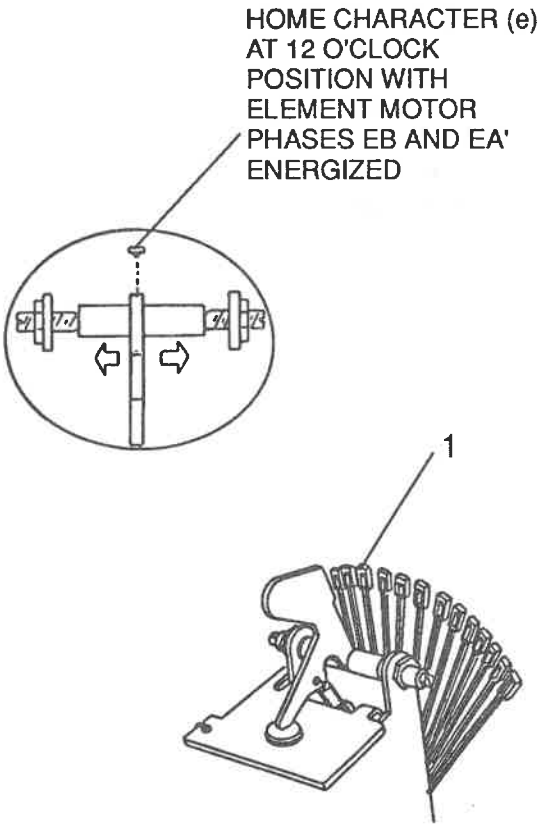
Two adjustments require energizing the Element Motor. Hold down the "E" Keybutton with Lid Switch Actuator released (or Lid closed), and turn power on. Release the Keybutton when Carrier movement stops. The Element Motor stays energized for one minute. After one minute, the Carrier moves to Space 12 and the machine is ready for typing or word processing. This procedure may be repeated as often as necessary to make the adjustment.

1. Element Motor Position

Requirement:

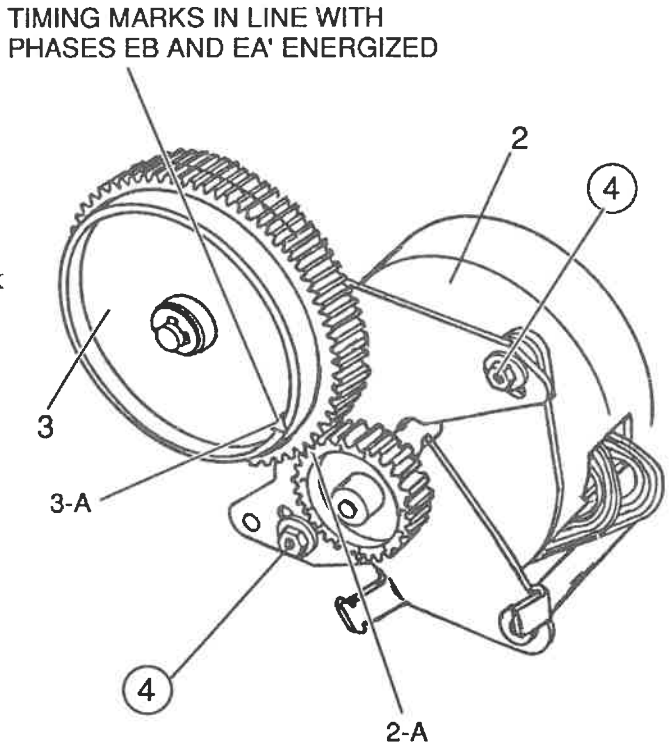
With Phases EB and EA' energized, Element Motor should hold the Home Character (e) Element Petal (1) at 12 o'clock position.

To Check: Hold down the "E" Keybutton, and turn power on to energize the Element Motor for one minute. Home Character Element Petal should be at 12 o'clock position, and parallel with Hammer. Turn power off and repeat this procedure if more time is required.



Adjustment:

1. With power off, loosen two Screws (4).
2. Energize Element Motor Phases EB and EA' (refer to "To Check" above).
3. Rotate Element Motor (2) so that Home Character (e) Element Petal is at 12 o'clock position. Motor Timing Mark (2-A) may align with Timing Mark (3-A).
4. Hold Motor in position and tighten upper Screw (4). Then tighten lower Screw (4). Check position of Element Petal and fine adjust if necessary. Turn power off.



2. Hammer Center Position

Requirement:

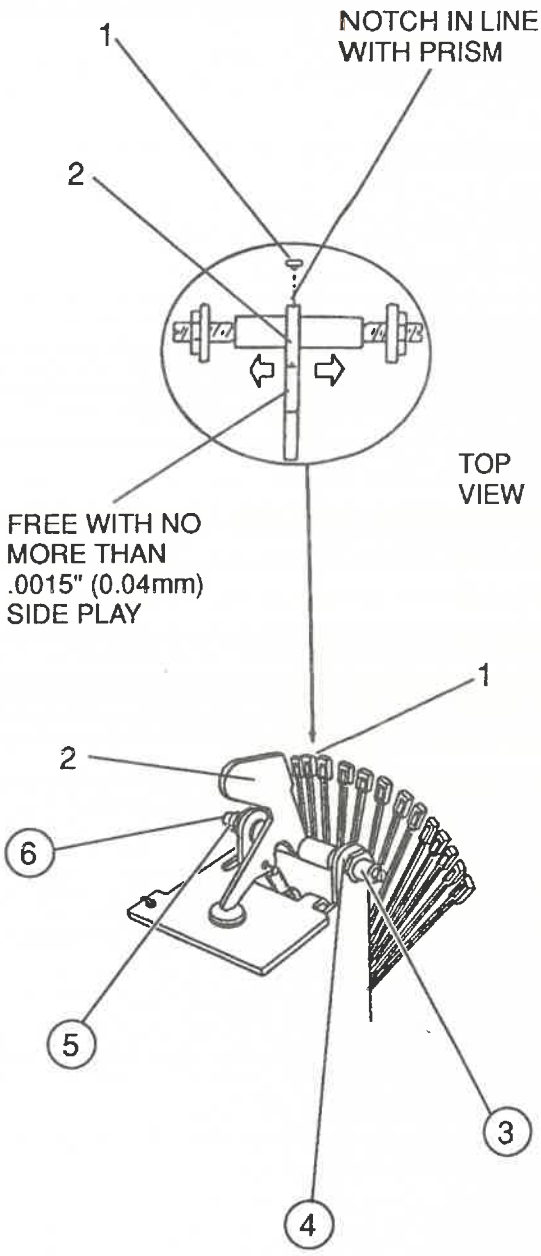
A) With Element Motor Phases EB & EA' energized, notch of Hammer (2) should align with Prism of Element Petal (1).

To Check: Energize Element Motor Phases EB and EA' (refer to Adjustment #1 "To Check"). Manually press Hammer (2) against Element Petal (1). Petal should not move left or right when Notch of Hammer engages Prism of Petal.

B) Hammer (2) should be free on its pivots with no more than .0015" side play.

Adjustment:

1. Energize Element Motor Phases EB and EA' (refer to Adjustment #1 "To Check").
2. Remove Ribbon Guide from Hammer Pivot Nuts.
3. Loosen Nuts (4) & (5) and regulate Right Pivot Screw (3) to meet Requirement A; tighten Right Nut (4).
4. Hold Hammer against Right Pivot Screw (3), and regulate Left Pivot Screw (6) to meet Requirement B; tighten Left Nut (5).
5. Replace Ribbon Guide onto Hammer Pivot Nuts.



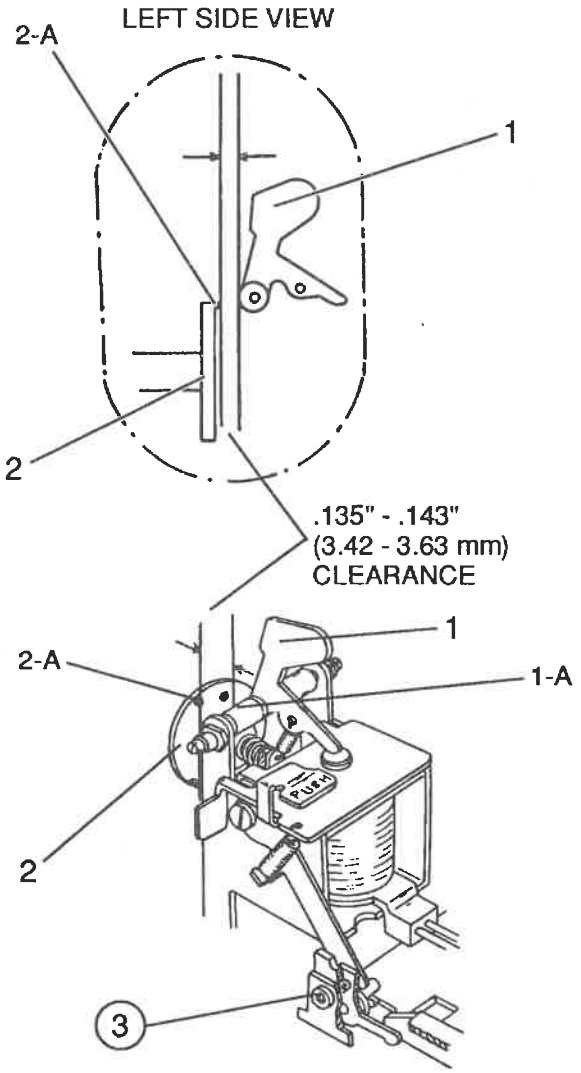
3. Hammer Assembly Position

Requirement:

With Hammer Assembly (1) latched in print position, there should be .135"-.143" clearance between Rear of Hammer Shaft (1-A) and Element Driver Pads (2-A). Check with Print Element and Ribbon Guide removed.

Adjustment:

1. Loosen Retractor Bracket Screw (3).
2. Rotate Element Driver (2) so that one pad is opposite Hammer Shaft.
3. With Hammer Assembly (1) latched in print position, insert a .139" Shim between Hammer Shaft (1-A) and Driver Pad (2-A).
4. Hold Hammer Assembly (1) against Shim, and tighten Screw (3).
5. Replace Ribbon Guide and Print Element.



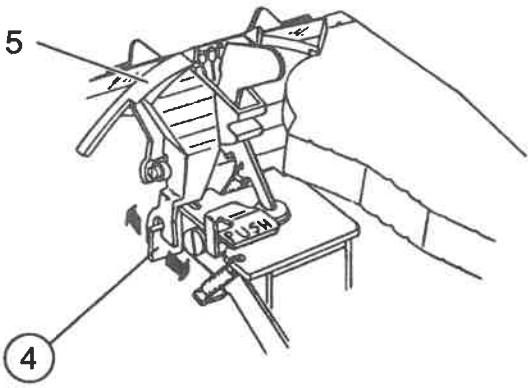
4. Ribbon Guide Position

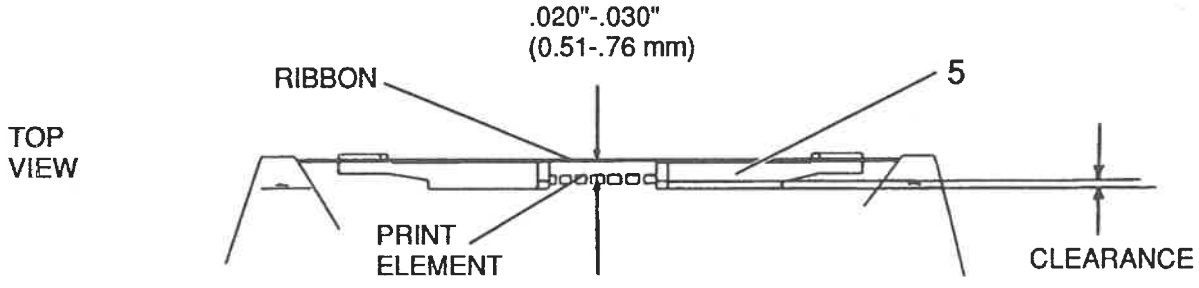
Requirement:

With a Ribbon Cassette in place, there should be .020"-.030" clearance between the Ribbon and the typeface of the Print Element. *Note:* This should provide clearance between the Print Element and the inside surface of the Ribbon Guide (5).

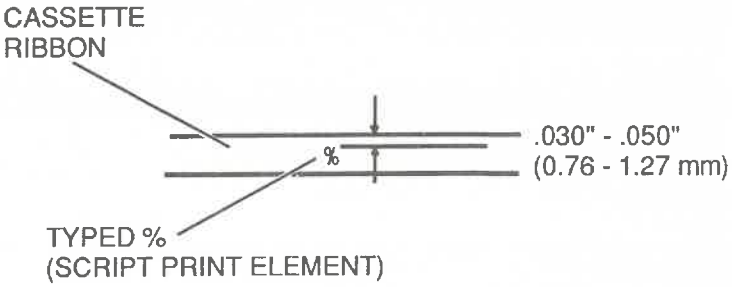
Adjustment:

Form Hammer Solenoid Ear (4) forward or rearward to position Ribbon Guide.





5. Cassette Ribbon Position

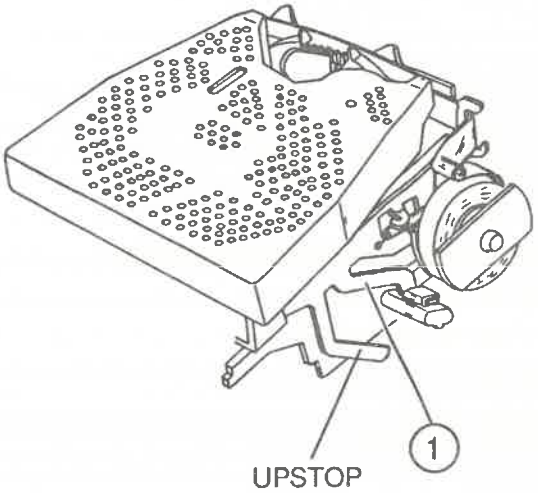


Requirement:

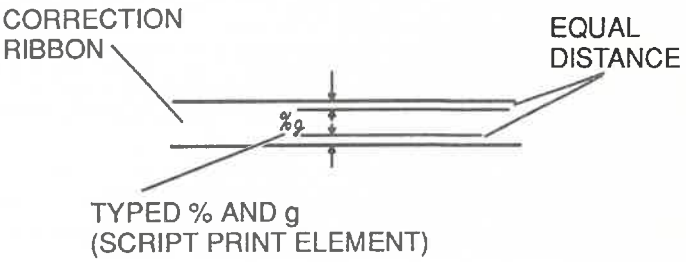
When typed with a Script Print Element, the top of the "%" character should be .030"-.050" from the top of the Cassette Ribbon.

Adjustment:

Form Downstop Arm (1) on Correction Lift Bail up or down.



6. Correction Ribbon Lift



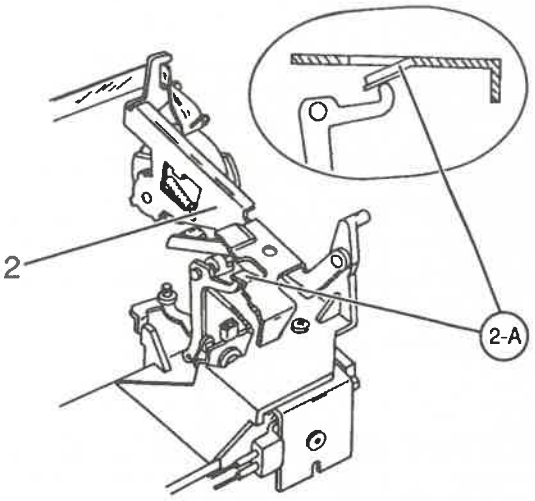
Requirement:

When correcting with a Script Print Element, the distance between the top of the "%" character and the top of the correction ribbon should equal the distance between the bottom of a lower case "g" and the bottom of the correction ribbon.

Adjustment:

Form Arm (2-A) on Correction Lift Bail (2).

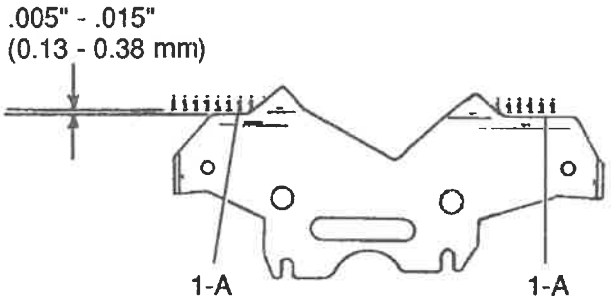
Note: Be sure Correction Lift Bail Upstop does not restrict motion of Bail.



7. Line Indicator Position

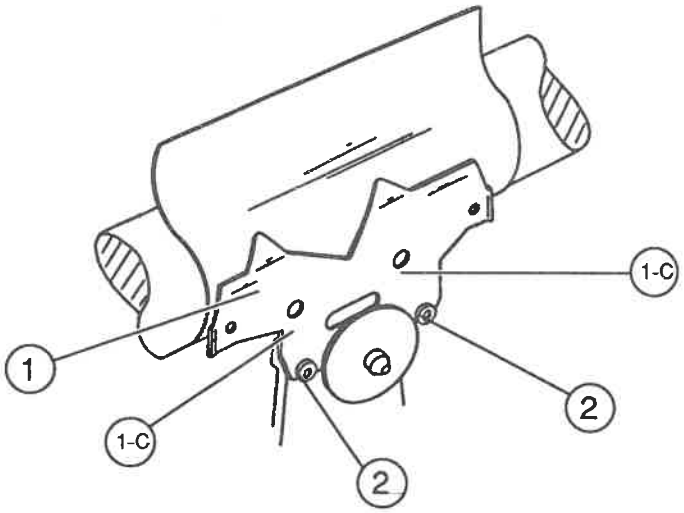
Requirement:

Line Indicator Surfaces (1-A) should rest .005"-.015" below a row of printed "i's," and should be parallel with the typed characters.



Adjustment:

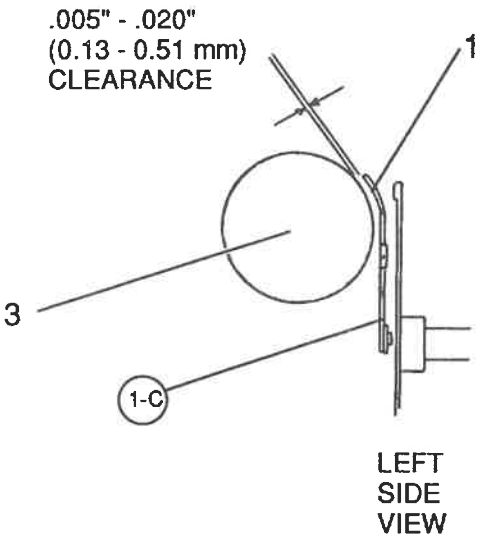
Position Line Indicator (1) with attaching Screws (2).



8. Line Indicator Clearance from Platen

Requirement:

There should be .005"-.020" clearance between Line Indicator (1) and Platen (3).



Adjustment:

Form Left and Right Line Indicator Surfaces (1-C) forward or rearward.

SECTION 6

TROUBLESHOOTING

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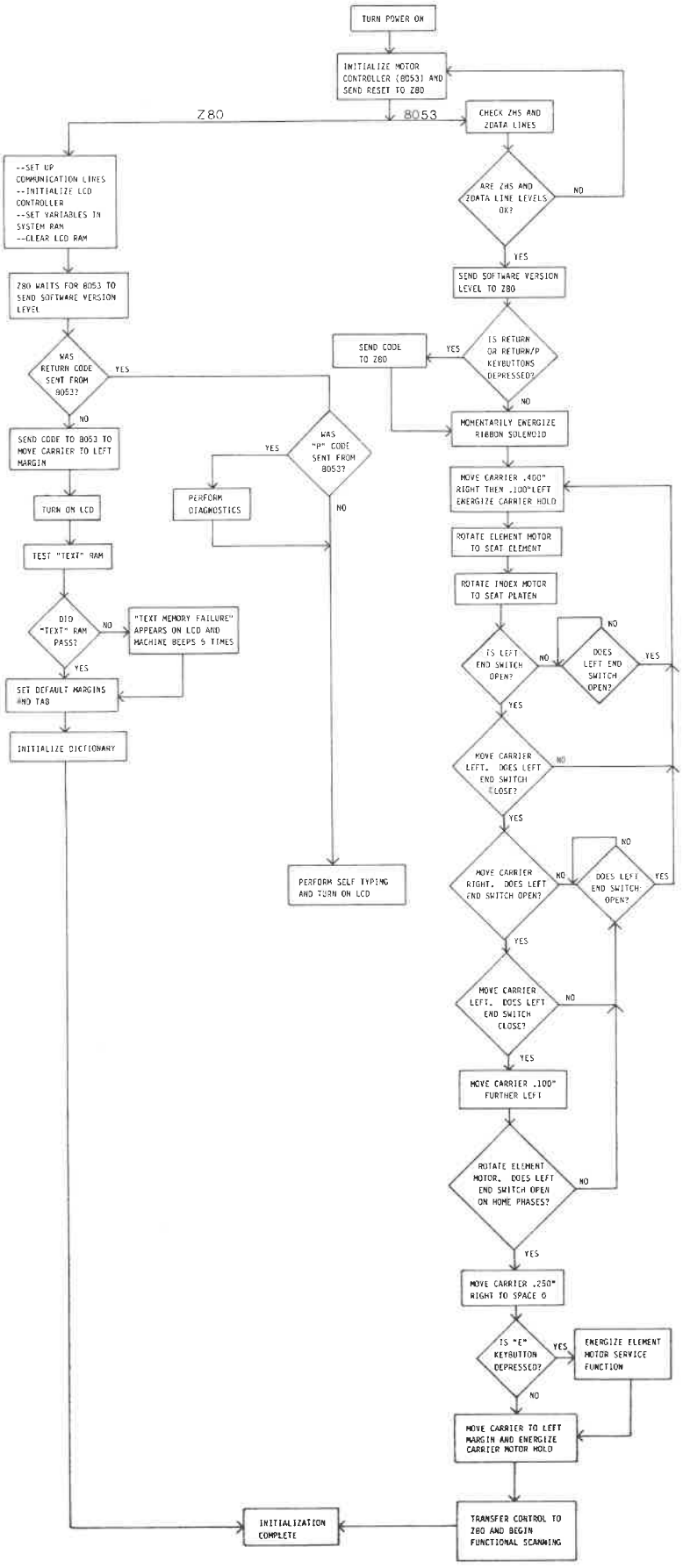
INITIALIZATION FLOW CHART


TURN POWER ON
INITIALIZE MOTOR CONTROLLER (8053) AND SEND RESET TO Z80
Z80
8053
CHECK ZHS AND ZDATA LINES
--SET UP COMMUNICATION LINES --INITIALIZE LCD CONTROLLER --SET VARIABLES IN SYSTEM RAM --CLEAR LCD RAM
ARE ZHS AND ZDATA LINE LEVELS OK?
NO
YES
SEND SOFTWARE VERSION LEVEL TO Z80
Z80 WAITS FOR 8053 TO SEND SOFTWARE VERSION LEVEL
IS RETURN OR RETURN/P KEYBUTTONS DEPRESSED?
YES
SEND CODE TO Z80
NO
WAS RETURN CODE SENT FROM 8053?
YES
NO
MOMENTARILY ENERGIZE RIBBON SOLENOID
SEND CODE TO 8053 TO MOVE CARRIER TO LEFT MARGIN
WAS "P" CODE SENT FROM 8053?
YES
NO
PERFORM DIAGNOSTICS
MOVE CARRIER .400" RIGHT THEN .100"LEFT ENERGIZE CARRIER HOLD
TURN ON LCD
ROTATE ELEMENT MOTOR TO SEAT ELEMENT
TEST "TEXT" RAM
ROTATE INDEX MOTOR TO SEAT PLATEN
DID "TEXT" RAM PASS?
NO
"TEXT MEMORY FAILURE" APPEARS ON LCD AND MACHINE BEEPS 5 TIMES
IS LEFT END SWITCH OPEN?
NO
DOES LEFT END SWITCH OPEN?
NO
YES
YES
YES
SET DEFAULT MARGINS AND TAB
MOVE CARRIER LEFT. DOES LEFT END SWITCH CLOSE?
NO
YES
INITIALIZE DICTIONARY
MOVE CARRIER RIGHT. DOES LEFT END SWITCH OPEN?
NO
DOES LEFT END SWITCH OPEN?
NO
YES
YES
PERFORM SELF TYPING AND TURN ON LCD
MOVE CARRIER LEFT. DOES LEFT END SWITCH CLOSE?
NO
YES
MOVE CARRIER .100" FURTHER LEFT
ROTATE ELEMENT MOTOR. DOES LEFT END SWITCH OPEN ON HOME PHASES?
NO
YES
MOVE CARRIER .250" RIGHT TO SPACE 0
IS "E" KEYBUTTON DEPRESSED?
YES
ENERGIZE ELEMENT MOTOR SERVICE FUNCTION
NO
MOVE CARRIER TO LEFT MARGIN AND ENERGIZE CARRIER MOTOR HOLD
TRANSFER CONTROL TO Z80 AND BEGIN FUNCTIONAL SCANNING
INITIALIZATION COMPLETE

INITIALIZATION SEQUENCE

The sequence of events which occur during initialization is described below. Understanding this process enables the technician to compare what ***does*** happen with what ***should*** happen, which can often lead to quick diagnosis of a problem.

1. When the Power Switch is turned on, the Motor Controller (8053) initializes, and it Resets the Memory Controller (Z80). Also, the Watchdog Circuit begins to monitor the Motors and Solenoids.

2. At this point the initialization process is divided between the Motor Controller (8053) and the Memory Controller (Z80).

3. The **Motor Controller** (8053) performs the following sequences:
   - A) The 8053 checks ZHS and Z Data line levels. If these are not okay, initialization starts over.
   - B) The 8053 sends Software Version Level to the Z80.
   - C) The Motor Controller checks if the Return or Return/P Keybuttons are depressed, and if so, the 8053 sends the Code to the Z80.
   - D) The Ribbon Solenoid momentarily energizes to insure the Ribbon Mechanism is reset.
   - E) The Carrier moves .400" to the right to assure that the Left End Switch Positioner is not holding the Left End Switch closed, and then moves .100" to the left.
   - F) The Electronics applies holding current to the Carrier Motor phases to stabilize the Carrier Motor Shaft.
   - G) The Element Motor Shaft rotates quickly to snap the Element onto the Drive Disc (a maximum of 2 1/2 revolutions).
   - H) The Index Motor Shaft rotates for 1/2 forward linespace and then 1/2 reverse linespace to make sure the Drive Gears, Pinion, and Platen Gear are seated properly.
   - I) The Electronics checks if the Left End Switch is open. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.
   - J) The Carrier moves left for a maximum of four seconds to check the closing of the Left End Switch. If the Left End Switch never closes, the Initialization Sequence repeats itself every four seconds until the switch is closed or power is turned off.
   - K) The Carrier moves .100" to 1.00" to the right and the Electronics checks if the Switch opens. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.
   - L) The Carrier moves to the left until the Left End Switch closes, and then another .100" to the left.
   - M) The Electronics energizes the Element Motor counterclockwise for up to 2.7 revolutions. When the ear on the Left End Switch Positioner drops into the notch on the Rear Scissors Gear under Spring Tension, the Left End Switch opens. The Electronics stops shaft rotation and checks that the Left End Switch opened on the Element home phases. If the Left End Switch does not open, the Electronics holds the Carrier stable until the switch opens. If the Switch does not open when the proper Element Motor phases are turned on, the initialization sequence repeats until this does occur, or until power is turned off.

3. The **Motor Controller** (continued)

   N) Carrier moves approximately .250" to the right. This new location is reference position Zero.

   O) The Electronics checks to see if the "E" Keybutton is depressed for the Element Service Function. If so, the Electronics energizes the Element Motor for approximately one minute.

   P) If "E" Keybutton is not depressed, the 8053 moves the Carrier to the Left Margin and energizes the Carrier Motor hold.

   Q) The 8053 initialization is now complete.

   R) The 8053 now transfers operational control to the Z80 and begins functional scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

4. The **Memory Controller** Z80 performs the following sequences while the 8053 is performing its sequences:

   A) The Z80 sets up communication lines between it and the 8053; initializes the LCD Controller; sets the variables in the System RAM, and clears the LCD RAM to insure no erroneous data is present.

   B) The Z80 waits for the 8053 to send the Software Version Level.

   C) The Z80 checks to see if the Return or Return/P Code was sent from the 8053. If Return Code was sent, the Z80 instructs the 8053 to perform Self Typing. If Return and P Code was sent, the Z80 instructs the 8053 to perform the Diagnostic Tests. Z80 initialization stops at this step when doing the Self Typing or Diagnostics.

   D) If no Return Code was issued by the 8053, the Z80 sends code to tell the 8053 to move the Carrier to the Left Margin (Space 12).

   E) The LCD turns "On."

   F) The Z80 writes Test Text data to the "TEXT" RAM and then reads this data. If the Text data is correct, the next step occurs. If not, "TEXT MEMORY FAILURE" appears on the LCD, and the machine beeps five times before the next step.

   G) The Z80 sets the 10 pitch default Margins and Tab.

   H) The Dictionary initializes.

   I) The Z80 initialization is complete and the Z80 has control over all future operations except scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

5. Once 8053 and Z80 initialization are both complete, the machine initialization is complete.

TROUBLESHOOTING GUIDE FOR ELECTRICAL PROBLEMS

This Troubleshooting Guide provides probable causes for some specific machine problems. There is no intent to cover every possible thing that could go wrong. Since electrical problems may cause a machine failure during initialization, the technician should read and thoroughly understand the preceding section on the Initialization Sequence.

OBSERVE STATIC PRECAUTIONS

Important: When working with static sensitive devices, such as the LCD and Printed Circuit Boards, be sure to observe static precautions to prevent damage to these devices.

GENERAL TROUBLESHOOTING TECHNIQUES

- Look for the obvious (broken wires, unplugged connectors, etc.)
- Check the problem part first, and then logically limit the possibilities through all associated wiring, connectors, and circuit boards.
- Check mechanical functions for freeness, lubrication, and proper operation.
- Check standard adjustments.

Diagram Reference Symbol:

7B-1 Indicates appropriate diagram page number.

Watchdog Circuit

The Watchdog Circuit is a safety circuit that monitors the length of time that the Ribbon Solenoid, Hammer Solenoid, and Carrier Motor are energized. If the above components remain energized longer than normal, the Watchdog Circuit forces the Slave Microprocessor (8053) to reset and try to reinitialize the machine.

To disable the Watchdog Circuit for troubleshooting purposes, short point "A" of Diode CR19 to ground. If not disabled, the Watchdog Circuit forces the Slave (8053) Microprocessor to continually reset.

Control PC Board Connections

When troubleshooting the PWP, it is not necessary to have the LCD and Disk Drive connected to the Control PC Board. Also, if the PWP initializes correctly without these components, but not when they are connected, a problem exists in either the LCD or Disk Drive. Likewise, Keyboard, Cursor Keypad, and Mode Switch do not have to be connected to the PC Boards either. When the Mode Switch is disconnected, the PWP defaults to the typewriter mode.

SYMPTOM: Machine Appears Totally Dead

(i.e. LCD is blank, and Carrier does not move at all)

Probable Causes:
1) .75 Amp Fuse (Slo-Blo)
2) Transformer
3) AC Input Receptacle
4) Power Switch
5) Power Cord
6) Control PC Board
7) ROM U11 Defective

How to Isolate Problem

If Fuse is not blown, check the Transformer primary circuit as follows: With machine un-plugged, detachable Cord in place, and Power Switch turned "On," use an Ohmmeter to measure resistance between the Hot and Neutral Prongs of the Power Cord. The reading should be approximately 9.9 ohms. ***7B-1***

If the measured resistance is correct, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section. If not, check the Power Cord, Fuse, AC Input Receptacle, and Power Switch: Replace defective parts. If these parts are good, replace the Transformer.

If the Fuse was blown, isolate the fault as follows:

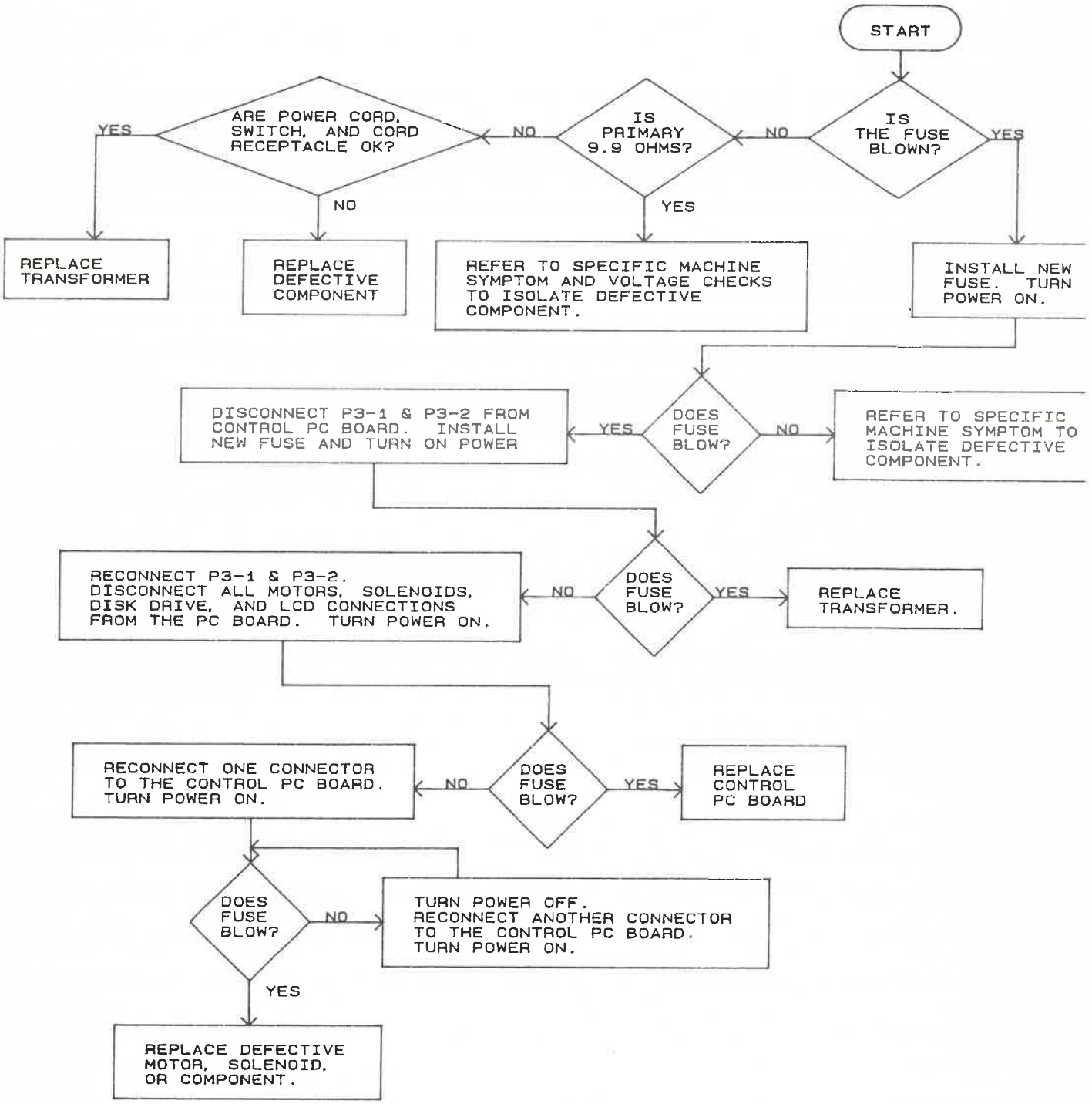
A. Install a new fuse and turn Power On. If the fuse does not blow right away when power is turned on, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section to determine which component may have caused the fuse to blow.

B. If the fuse did blow in Step A, turn Power Off and disconnect Transformer Connectors P3-1 & P3-2 from the Control PC Board. Install a new fuse, and turn Power On. If the fuse blows, there's a short in the Transformer circuit. Replace Transformer.

C. If the fuse did not blow in Step B, turn Power Off. Plug Transformer Connectors P3-1 & P3-2 back into the Control PC Board, disconnect all Motor, Solenoid, Disk Drive, and LCD Connectors from the Control PC Board, and turn Power On. If the fuse blows, there's a short on the Control PC Board. Replace Control PC Board.

   If the fuse does not blow, turn Power Off, reconnect one Connector to the Control PC Board. Turn Power On. If the fuse blows now, there's a short in that Component. Replace defective Component. If it does not blow, use the process of elimination to determine which unplugged component (LCD, Disk Drive, Motors, or Solenoids) is shorted, and replace it.

MACHINE TOTALLY DEAD


START
IS THE FUSE BLOWN?
YES
NO
IS PRIMARY 9.9 OHMS?
NO
YES
ARE POWER CORD, SWITCH, AND CORD RECEPTACLE OK?
NO
YES
REPLACE TRANSFORMER
REPLACE DEFECTIVE COMPONENT
REFER TO SPECIFIC MACHINE SYMPTOM AND VOLTAGE CHECKS TO ISOLATE DEFECTIVE COMPONENT.
INSTALL NEW FUSE. TURN POWER ON.
DOES FUSE BLOW?
YES
NO
DISCONNECT P3-1 & P3-2 FROM CONTROL PC BOARD. INSTALL NEW FUSE AND TURN ON POWER
REFER TO SPECIFIC MACHINE SYMPTOM TO ISOLATE DEFECTIVE COMPONENT.
DOES FUSE BLOW?
NO
YES
RECONNECT P3-1 & P3-2. DISCONNECT ALL MOTORS, SOLENOIDS, DISK DRIVE, AND LCD CONNECTIONS FROM THE PC BOARD. TURN POWER ON.
REPLACE TRANSFORMER.
DOES FUSE BLOW?
NO
YES
RECONNECT ONE CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE CONTROL PC BOARD
DOES FUSE BLOW?
NO
YES
TURN POWER OFF. RECONNECT ANOTHER CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE DEFECTIVE MOTOR, SOLENOID, OR COMPONENT.

SYMPTOM: Machine Fails to Complete Initialization or Repeats Initialization

When checking initialization, move Carrier to the center of the machine, and turn Power On. Use the following guide to determine the cause of the failure. Refer to the Wiring Diagram. *7B-1*

Symptom	Probable Cause
Element Motor rotates, Carrier does not move, LCD is dark, Platen wiggles approximately every 3 seconds. Contrast control operates normally.	1) Carrier Motor Connector disconnected. 2) Control PC Board--Carrier Motor Circuit bad.
Element Motor doesn't rotate. Machine tries to initialize and repeats this until power is turned off.	1) Element Motor Connector disconnected 2) Control PC Board--Element Motor Circuit bad.
Carrier vibrates against Left Side Frame, then tries to reinitialize approximately every 4 seconds.	1) Left End Switch or switch connection is always open. 2) Control PC Board--Left End Switch Circuit bad.
Carrier moves right about .4"; Element rotates; Carrier moves right again about .8" and stays stays there. LCD is dark blue. Contrast control works.	1) Left End Switch is always closed. 2) Control PC Board--Left End Switch Circuit bad.
Platen wiggles, Carrier moves right approximately .4", Element rotates, Carrier chatters, pauses, Carrier repeatedly chatters approximately every 4 seconds. LCD is dark. Contrast control works.	1) Carrier Motor Phase is open. 2) Control PC Board--Carrier Phase Circuit bad.
Machine initializes up to the point that the Copyright Message is displayed on LCD.	1) ROM U18 is defective. 2) Defective Control PC Board.
Machine does not initialize, but LCD is dark blue and EL Panel is lit.	1) ROM U11 and U18 are in wrong sockets (reversed). 2) Defective Control PC Board.
Machine does not initialize, LCD is blank, EL Panel is not lit, all Power Supply voltages are very low.	1) Transformer secondary connectors are on the wrong post header of Control PC Board. 2) Transformer is defective.
Element Motor noisy and sluggish during initialization. Strobing occurs during printing.	1) Element Motor Phase is open. 2) Control PC Board--Element Phase Circuit is bad.

LCD & EL Panel Problems *7B-1*

Symptom	Probable Cause
LCD is dark blue and no contrast control. EL Panel is lit.	1) No -13 VDC to LCD--Open -13V line in LCD Cable. 2) Defective LCD or Control PC Board.
Image on right half of LCD is clear. Image also shows on left half, but is distorted. EL Panel is lit.	1) D1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Image on left half of LCD is clear. Image also shows on right half, but is distorted.	1) D2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is blank; EL Panel is lit; and no contrast control.	1) FLM Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is completely blank; no contrast control.	1) LCD Cable Connector is reversed on on Control PC Board or LCD.
Slight loss of contrast on LCD. EL Panel is lit.	1) MB Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue, no contrast. EL Panel is lit.	1) CL1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue with vertical lines. Contrast control works. EL Panel is lit.	1) CL2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD flickers various block patterns and poor contrast control. EL Panel is lit.	1) +5 VDC Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Very narrow range or no contrast control. EL Panel is lit. Image is normal.	1) Defective Contrast Potentiometer on LCD. 2) Defective LCD.
LCD is dark, but Characters on LCD are okay, EL Panel does not light. Contrast control works.	1) No 120 VAC output from DC/AC Inverter. 2) Defective EL Panel. 3) 18 V line on LCD Cable open. 4) Defective Control PC Board. 5) Ground Line on LCD Cable open. 6) Defective EL Panel Pico Fuse F1.

Disk Drive Problems *7B-1*

Symptom	Probable Cause
LCD indicates "Disk Not Loaded" when options 4-7 are selected, but a Disk is in the Disk Drive.	1) Disk Drive Cable Connector is reversed on Control PC Board or Disk Drive.
Disk Drive runs continuously when a Disk Function is selected. Unable to get the Directory.	1) Ready Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
LCD indicates "Disk Not Loaded" when Disk is loaded in the Disk Drive.	1) $\overline{\text{MEDIA}}$ Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" occurs during any Disk Drive function.	1) $\overline{\text{WRGA}}$ Line on Disk Drive Cable open. 2) RDDT Line on Disk Drive Cable open. 3) Defective Disk Drive or Control PC Board.
Occasional "Disk Read Error" occurs during Disk Drive function.	1) $\overline{\text{DRESET}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" and Disk in Disk Drive is erased.	1) $\overline{\text{WRDT}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
Disk Drive Motor does not function and PWP Menu options 4-8 fail to operate.	1) $\overline{\text{MTON}}$ Line on Disk Drive Cable open. 2) No +6.5 volts to Disk Drive. 3) Defective Disk Drive or Control PC Board.
"Disk Write Protected" error when Disk in Drive is not "Write Protected."	1) $\overline{\text{WRPR}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
PWP initializes, but no Disk Drive functions operate.	1) No +5 volts to Disk Drive. 2) Defective Disk Drive or Control PC Board.

Miscellaneous *7B-1*

Symptom	Probable Cause
Machine completes initialization; Typewriter Mode is normal, but Word Processing Mode **cannot** be selected.	1) Mode Selector Switch. 2) Defective Control PC Board.
Prints wrong characters or strobes (Hammer strikes between Print Element Petals).	1) Incorrect Element Motor Position (Adj. #1). 2) Incorrect Hammer Center Position (Adj. #2). 3) Broken Disc on Element Drive Shaft or binding Element Drive Shaft. 4) Linefinder or Ribbon Guide interferes with Print Element. 5) Improper Element Scissors Gear tension. 6) Inside Scissors Gear slips on Element Drive Shaft. 7) Defective Element Motor. 8) Defective Control PC Board.
Index Motor vibrates noisily and fails to linespace.	1) Open or shorted windings in Index Motor. 2) Defective Control PC Board.
Hammer or Ribbon Drive Solenoid fails to fire.	1) Defective Solenoid. 2) Defective Control PC Board.
Beeper fails to beep.	1) Defective Beeper. 2) Defective Control PC Board.
Left Margin changes.	1) Felt Wipers on Carrier Rear Rail require lubrication. 2) Mechanical interference with Carrier movement. 3) Defective Control PC Board.
Poor vertical correction registration.	1) Linefinder binding on Platen. 2) Paper Feed Rollers binding. 3) Platen binding.
Correction Ribbon too slack (blouses).	1) Defective Brake Spring. 2) Defective Helper Spring on Brake Spring.
Correction Ribbon lifts during normal printing	1) +36 VDC on +18 VDC line from DC Power Supply of Control PC Board (Check Q13 on PC Board).

RESISTANCE AND VOLTAGE CHECKS

Use the following Resistance and Voltage Check Charts when troubleshooting problems with electrical components. With Volt/Ohmmeter probes on specified pins of the Connector, the resistance or voltage readings should read approximately at the values given in the charts. Note: Readings may vary between Volt/Ohmmeters. Refer to the Wiring Diagrams in the appropriate Diagrams Section and Pin locations.

Resistance Checks

All Resistance Checks must be made with the Power Off and the appropriate Connector unplugged from the Control PC Board. Refer to page 7B-1 to identify Connectors.

* When checking resistance of Motors, both common Connectors on each motor should be measured before assuming a phase is open. The correct resistance readings should occur on one or the other common, not both.

Component	*Connector*	*Pin Numbers*	*Approximate Resistance*
*Element Motor	P-ELE		
COM and A		3 **or** 4 & 1	24 Ω ± 7%
COM and A'		3 **or** 4 & 2	24 Ω ± 7%
A and A'		1 & 2	48 Ω ± 7%
COM and B'		3 **or** 4 & 5	24 Ω ± 7%
COM and B		3 **or** 4 & 6	24 Ω ± 7%
B' and B		5 & 6	48 Ω ± 7%
*Carrier Motor	P-CAR		
COM and A		3 **or** 4 & 1	50 Ω ± 7%
COM and A'		3 **or** 4 & 2	50 Ω ± 7%
A and A'		1 & 2	100 Ω ± 7%
COM and B'		3 **or** 4 & 5	50 Ω ± 7%
COM and B		3 **or** 4 & 6	50 Ω ± 7%
B' and B		5 & 6	100 Ω ± 7%
*Index Motor	P-IND		
COM and A		3 **or** 4 & 1	50 Ω ± 7%
COM and A'		3 **or** 4 & 2	50 Ω ± 7%
A and A'		1 & 2	100 Ω ± 7%
COM and B'		3 **or** 4 & 5	50 Ω ± 7%
COM and B		3 **or** 4 & 6	50 Ω ± 7%
B' and B		5 & 6	100 Ω ± 7%
Left End Switch	P-LES	1 & 2	0 Ohms when closed; Infinite (∞) ohms when open
Ribbon Solenoid	P-RSOL	1 & 2	9.60 Ω ± 1
Hammer Solenoid	P-HSOL	1 & 2	1.98 Ω ± .2
Transformer Primary	AC Plug (Switch must be turned on)	Prongs	Approximately 10 Ω
Transformer Secondaries	P3-1 (Blue Wires)	1 & 2	Approximately 10 Ω
	P3-2 (Red Wires)	1 & 2	Less than 1 Ω

DC Voltage Checks

All DC Voltage checks must be made with Connectors in place and Power On. Set Voltmeter for DC Volts and appropriate voltage range. With Power Off, touch common probe of Voltmeter to Logic Ground Reference Point ***7C-1***, and touch the other probe to the Check Point listed in the Chart. Turn Power On, allow machine to initialize, and take readings (Idle State). Refer to the appropriate Diagrams Section for Connector locations. ***7B-1 7C-1***

Caution: Whenever performing checks with Power On, take care not to short two points together with the Voltmeter probes.

Component	*Check Point*	*Location*	*Approximate DC Voltage*
Control PC Board: ***7C-1***			
Ribbon Solenoid	P-RSOL	Pins 1-2	+18 VDC
Hammer Solenoid	P-HSOL	Pins 1-2	+18 VDC
Element Motor	P-ELE	Pins 1-6	+18 VDC
Index Motor	P-IND	Pins 1-6	+18 VDC
Carrier Motor	P-CAR	Pins 1-6	+.7 or +4.2 VDC
Note:Voltage reading depends upon location of the Carrier Rotor during holding current.			
+5 VDC	5 Volt Test Point	(W2)	+4.75 to 5.25 VDC
+6.5 VDC	6.5 Volt Test Point	(W3)	+6.07 to 6.92 VDC
+18 VDC	18 Volt Test Point	(W4)	+16.83 to 19.17 VDC
-13 VDC	-13 Volt Test Point	(W1)	-12.5 to -13.5 VDC
Left End/Lid Switch (w/Switch open)	P-LES	Pin 1 Pin 2	0.0 VDC +4.9 VDC
Left End/Lid Switch (w/Switch closed)	P-LES	Pin 1 Pin 2	0.0 VDC 0.0 VDC
TW/WP Mode Switch (TW Position)	P-Mode	Pin 1 Pin 2	+4.9 VDC 0.0 VDC
TW/WP Mode Switch (WP Position)	P-Mode	Pin 1 Pin 2	0.0 VDC 0.0 VDC
LCD Connector:			
+5 VDC	P-LCD	Pin 6	+4.75 to 5.25 VDC
-13 VDC	P-LCD	Pin 4	-12.5 to -13.5 VDC
+18 VDC	P-LCD	Pin 2	+16.83 to 19.17 VDC
Disk Drive Connector:			
+5 VDC	P-Disk	Pin 11	+4.75 to 5.25 VDC
+6.5 VDC	P-Disk	Pin 2	+6.07 to 6.92 VDC
Bridge Rectifier DC Output:			
+36 VDC	C17	Left Side	Approximate 36 VDC

AC Voltage Checks

Make AC Voltage checks with Connectors in place and Power On. Set Voltmeter for AC Volts and appropriate voltage range. Touch probes to points listed below. ***7B-1 7C-1***

Check	*Check Points*	*Approximate Voltage*
Transformer Input	Check Line Voltage at Power Outlet	Line Voltage (117 VAC) ± 10%
Transformer Outputs	P3-1, Pins 1 & 2 (Blue Wires)	17 to 23 VAC
	P3-2, Pins 1 & 2 (Red Wires)	25.5 to 38.5 VAC
DC/AC Voltage Inverter Output	Inverter Output Pins	120 VAC (Approximate)

KEYBOARD SERVICE DIAGNOSTICS AT POWER UP

Several Keybuttons activate service functions and diagnostics when they are depressed and held down during initialization. To activate any of these functions, depress and hold down the Keybutton until after the Element homes during initialization. Jackets should be in place and deck closed. Release the Keybutton when the Service Function begins. Note: Mode Switch can be in either Word Processor or Type Mode.

OBSERVE STATIC PRECAUTIONS

If the Keyboard is disconnected from the machine, Service Functions can be entered by shorting the appropriate Keyswitch Row and Column pins on Keyboard Connector J1. Remove the jumper after the Service Function begins. Refer to the appropriate Keyboard Layout Chart and Matrix Diagram to determine which Row and Column should be shorted to perform the Service Function. *7A-2 7A-3*

Keybutton	Function
Return	Initiates Self Typing, checks LCD function, and displays the part numbers of the Motor Control, Memory Control, and Dictionary Software installed on the Control PC Board. When this function starts, the LCD turns completely dark. The machine prints out a line of characters, corrects some in the middle line, and then performs a linespace and carrier return. On the second line, the LCD turns completely light, and the machine repeats the Self Typing and correcting it did on the first line. On the third line, the LCD background remains light, and the Motor Control, Memory Control, and Dictionary Software part numbers are displayed in the center of the LCD. Self Typing continues as on previous lines. On the fourth line, a dark border is added to the previous display on the LCD, and Self Typing continues. After the fourth line, the display turns dark, and the cycle repeats until power is turned off.
"E"	Carrier stops at Space 0 and the Electronics energizes Element Motor phases EB and EA' for one minute to make adjustments. After one minute, the Carrier moves to the Left Preset Margin and the machine enters the Typewriter or Word Processor Mode, depending on Mode Switch selection.
Return & P	Initiates a series of Diagnostic Tests that are performed by the electronics of the typewriter. These tests include: 1) Keyboard & Keypad Test, TW/WP Switch Test 2) CRC Generator Test 3) RAM Test 4) ROM Test 5) Disk Drive Test 6) Self Typing

A description of each test and error messages are on the following pages.

1) Keyboard, Keypad, and TW/WP Mode Switch Test

With the Return and P Keybuttons depressed and power turned on, the machine initializes and a graphic display of all the Keybuttons of the Keyboard and Keypad, plus TW & WP for the Mode Switch, appear on the LCD.

When each Keybutton is depressed, the corresponding character disappears from the LCD because the electrical circuit for that character is completed. If the character remains on the LCD, the Keyswitch did not close the circuit, and the cause should be determined (i.e. Bad Flexible Circuit, Molded Dome Switch, etc.).

After **all** Keybuttons disappear from the LCD, move the TW/WP Mode Switch three times to delete TW and WP from the LCD and initiate the next test (CRC Generator). If all Keybuttons are **not** deleted from the LCD prior to moving the TW/WP Mode Switch, the LCD indicates a "KEYBOARD FAILURE" and stops further testing.

If the Keyboard/Keypad Test is not required, simply move the TW/WP Mode Switch three times, and depress the "S" Keybutton to skip the Keyboard Test. NOTE: To skip any other test after the Keyboard Test, just depress the "S" Keybutton and the next test automatically begins.

2) CRC Generator Test

This test checks the CRC Generator in the ASIC chip. If the Generator is defective "CRC GEN. FAILURE" appears on the LCD and no further test can be performed. If the Generator is okay, the next test automatically begins.

3) RAM Test

The RAM Test performs a check on RAM Bank 1 and RAM Bank 2. If RAM is okay, the next test automatically begins. If a "RAM FAILURE" is detected, the following is displayed on the LCD:

RAM FAILURE AAAA:XXYY

Explanation: RAM Chips U8 and U9 are defective. The test does not determine which one; replace both. AAAA is the address in RAM that failed. XX is the expected data, and YY is the data found.

4) ROM Test

The ROM Test performs a check on Program ROM 0, Program ROM 1, and Dictionary ROM 2. If all ROM's are okay, the next test automatically begins. If a ROM fails, the following is displayed on the LCD:

ROM FAILURE IJ AAAAA:XXYY

Explanation: There are three ROM Chips on the Control PC Board. The test determines the defective ROM by displaying the U number (i.e. 10 represents U10) in the position indicated by IJ on the LCD. AAAAA is the address in ROM where the data is stored. XXYY is the data that should be in ROM. Replace the defective ROM.

5) Disk Drive Test

Warning: The Disk Drive Test removes **all** data on Disk being tested. Any files on a Disk used for the Disk Drive Test will be lost. Also, the Disk Drive Test leaves the Directory on the Test Disk blank.

A) The first check determines if a prepared Disk is inserted in the Disk Drive. If one is not inserted, "DISK NOT READY" appears on the LCD. Insert a **prepared** Disk in the Disk Drive and press Return.

B) Next, the electronics determines if the Disk is Write Protected. If the Disk is, the LCD displays "DISK WRITE PROTECT." Write enable the Disk **or** insert a different Disk, and then press the Return Keybutton.

C) In the next checks the electronics writes a test pattern, reads the test pattern, and checks the data read from the Disk for accuracy. This sequence is performed twice for a total of six operations. If Disk Drive test is okay, the last test, Self Typing, begins automatically. If an error occurs during the test in Step C, the following is displayed on the LCD:

DISK FAILURE IJ AAAA:XXYY

Explanation: There are many possible error messages that could appear on the LCD. IJ is the Code Field which indicates the detected failure. Note: When I is 1, J is not used; therefore, J is represented by 0 (Zero). Also, when I is 1, IJ is followed by AAAA:XXYY. AAAA is the address in RAM Memory that failed. XX is the expected data and YY is the data found. The most probable cause of the Data Compare Error (when IJ is 10) is the Disk Controller (U6 on Control PC Board) cannot write to a Disk.

The IJ Code Field errors are listed below. First determine the I value followed by the J value. For example, if the IJ error displayed was 63, that means there was a failure during a Directory Write because the "Sync" in ID Field could not be found.

I Value	1 Data Compare Error
	2 Failure During Disk Write
	3 Failure During Disk Read
	6 Failure During Directory Write
	7 Failure During Directory Read
J Value	O Disk Not Ready After Initial Check Passed
	1 Disk Write Protect After the Initial Check Passed
	2 Not Used
	3 "Sync" in ID Field Not Found (i.e. having trouble reading disk)
	4 Data Mark in ID Field (i.e. having trouble reading disk)
	5 Bad CRC on ID Field (i.e. defective disk)
	6 Sector Not Found (i.e. disk not prepared, defective disk)
	7 Data Sync Not Found (i.e. disk, not prepared, defective disk)
	8 Data "Data Mark" Not Found
	9 Data CRC is Bad

Note: The examples listed above are a few of the most probable faults that could occur. Use the substitution method to isolate the fault to the Disk, Control PC Board, Disk Drive, or Disk Drive Cable.

6) Self Typing

After successful completion of the Disk Drive Test, the LCD turns dark and the Carrier starts the Self Typing sequence that is identical to depressing the "Return" Keybutton on power up. This test continues until the machine power is turned off.

KEYBOARD AND CURSOR KEYPAD TROUBLESHOOTING PROCEDURE

Note: Refer to the appropriate Keyboard Switch Layout and Matrix Charts.
7A-2 7A-3 7A-4

1. Identify the Matrix Position Number(s) for the Key(s) from the Keyboard Switch Layout Chart (the character "5" is matrix position S6).

2. Identify the Column and Row for that position from the Keyboard Matrix Chart. Then determine Keyboard Connector Pin numbers that correspond with the column and row of the suspect key (i.e. position S6 is tied to Column C5 and Row R0, which correspond to Pins 3 & 14 of the Keyboard Connector).

3. Determine whether the problem is with the Keyboard or Control PC Board as follows:

   A) Remove the Keyboard from the machine under test. Power up the machine to initialize it. Set Mode Switch to Typewriter Mode if Switch is plugged into Control PC Board.

   To check operation of any individual character, simply short the appropriate pins on the Control PC Board Connector J1 to see if that particular character types. For example, if checking the character "5," touch a Jumper Wire between Pins 3 & 14 of Connector J1. This allows the typewriter to type the character "5" and repeat it until the Jumper Wire is removed. If the character fails to type, the problem is in the Control PC Board and replacement is necessary.

   B) If character does type, then there is a Keyboard fault.

4. Diagnose a Keyboard fault as follows:

   A) Touch the one lead of an ohmmeter to the pin on the Keyboard Connector that corresponds with the appropriate Column. Then touch the other lead to the pin on the Keyboard Connector that corresponds with the appropriate Row [i.e. for position S6 touch one lead to Connector P1, Pin 3, (Column C5) and the other lead to Connector P1, Pin 14 (Row R0)].

   Note: Since there are no Diodes used with this Keyboard, it makes no difference which ohmmeter lead is touched to the Matrix Column and which one is touched to the Matrix Row.

   B) Depress the Key being checked. If the switch is good, the ohmmeter should indicate less than 1000 ohms resistance. (Readings vary with different meters. To know what the meter should read, take a similar reading on a known good Key Switch in the Keyboard Circuit). If meter indicates an open, replace the Molded Dome Switches.

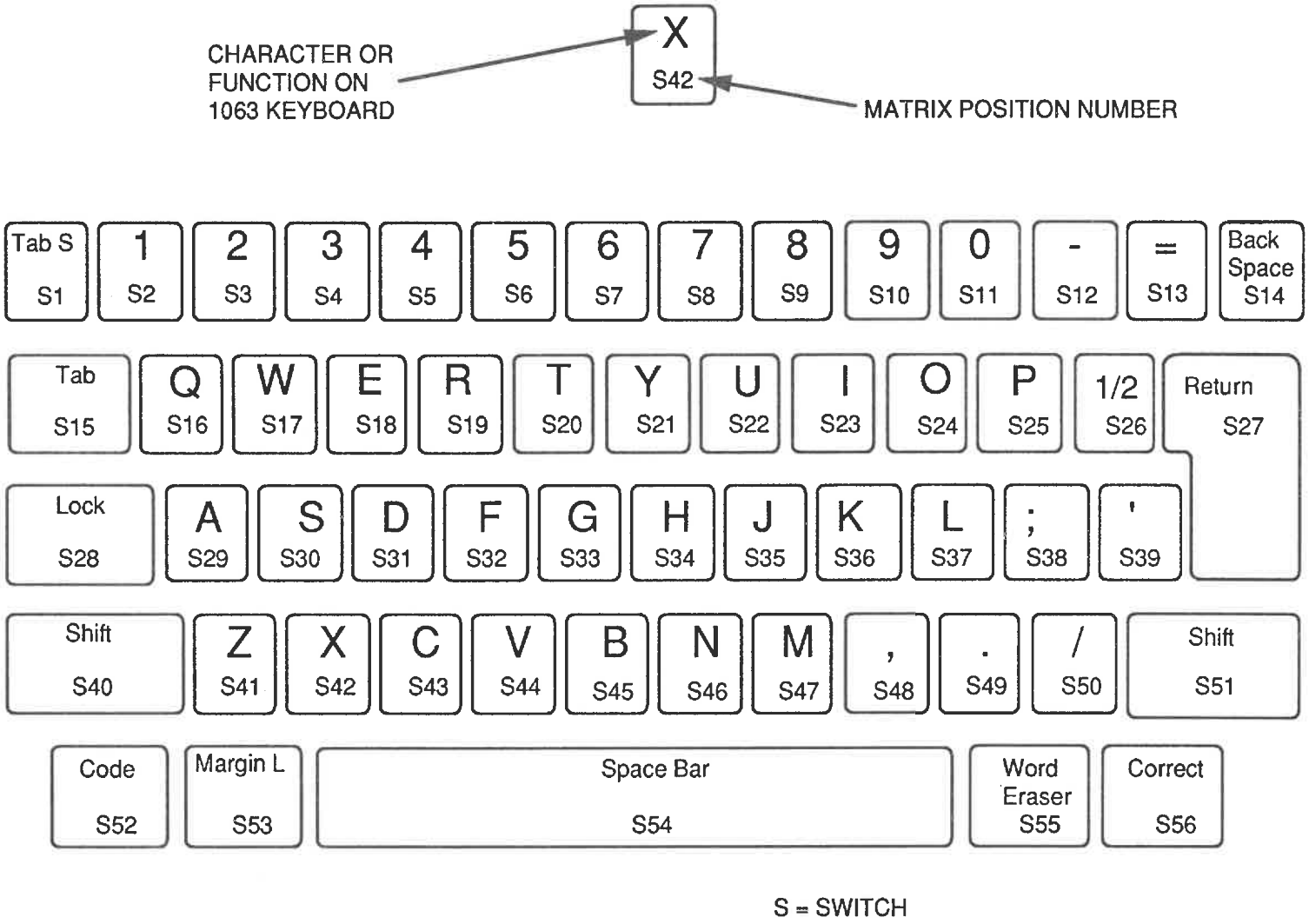
   C) If there are a definite 7 or 8 characters or functions that do not operate, check to see if those 7 or 8 characters or functions are in the same Column or Row in the Keyboard Matrix. If they are, check all switches in that Column or Row through the Keyboard Connector. If they are bad, replace the Keyboard Flexible Circuit.

SECTION 7

DIAGRAMS

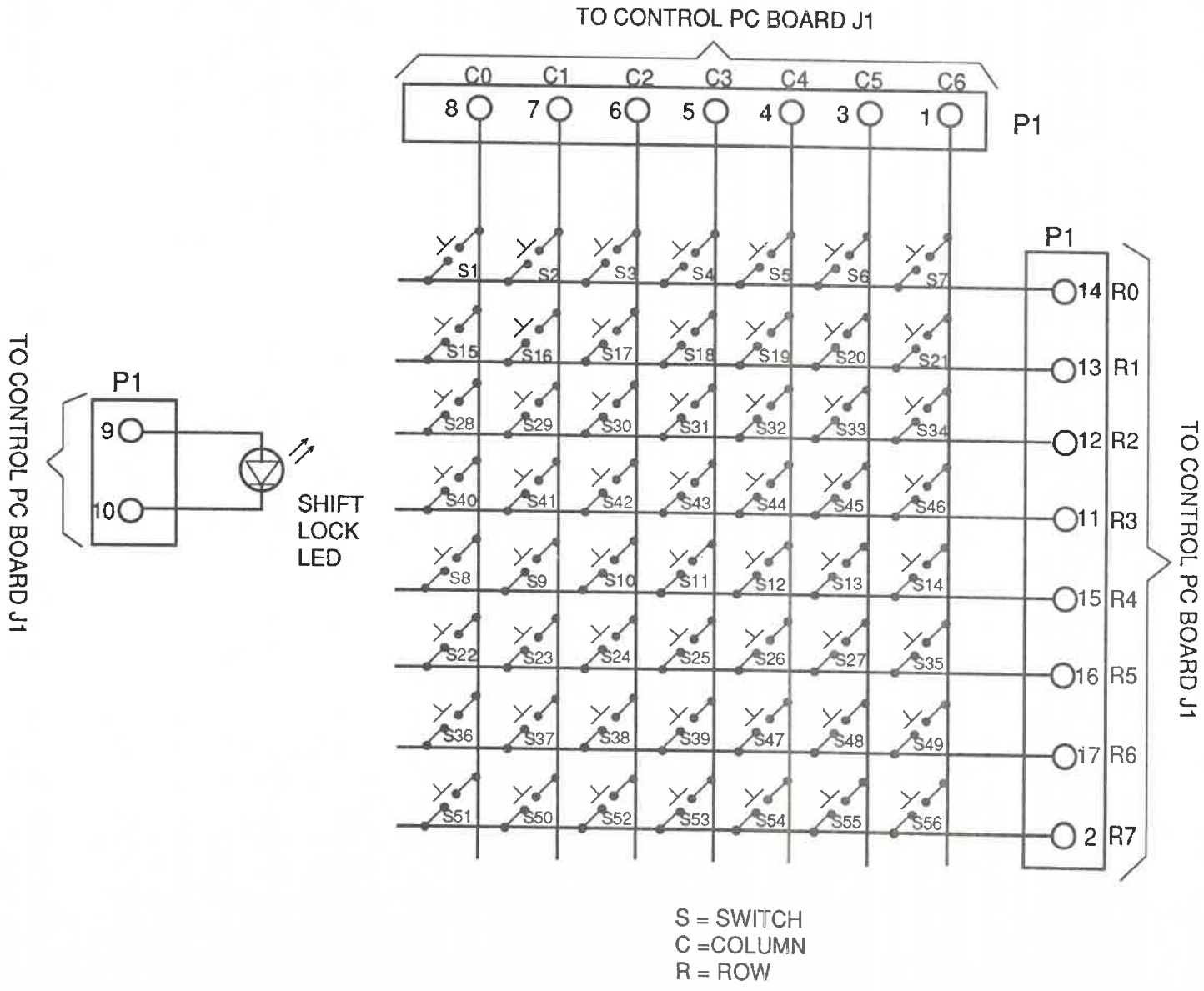
		Page Number
7A	KEYBOARD DIAGRAMS	
	Keyboard Layout Chart	7A-2
	Keyboard Matrix	7A-3
	Cursor Keypad Layout & Matrix Charts	7A-4
7B	WIRING DIAGRAM	7B-1
7C	COMPONENT DIAGRAM	
	Control PC Board	7C-1
7D	SCHEMATIC DIAGRAM	
	Control PC Board -- Power Supply, Drivers	7D-1
	Control PC Board -- Logic, RAM, ROM	7D-2
7E	WIRE ROUTING	
	Left Side	7E-1
	Right Side	7E-2
	Control PC Board	7E-3
	Carrier	7E-4
7F	WAVE FORMS	7F-1 7F-2
7G	COMPONENT LAYOUTS	
	Component Side	7G-1
	Solder Side	7G-2

KEYBOARD LAYOUT CHART

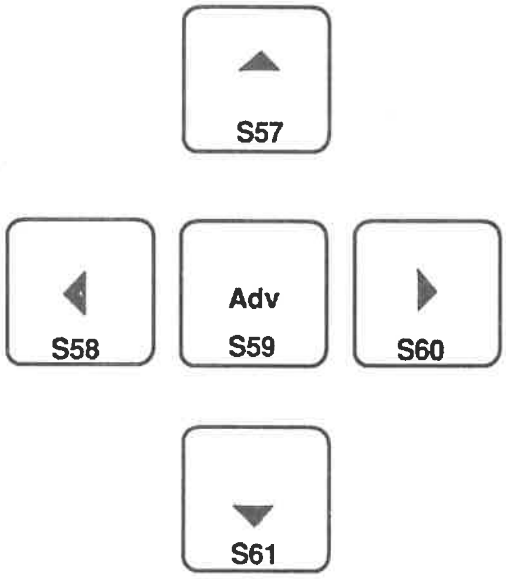


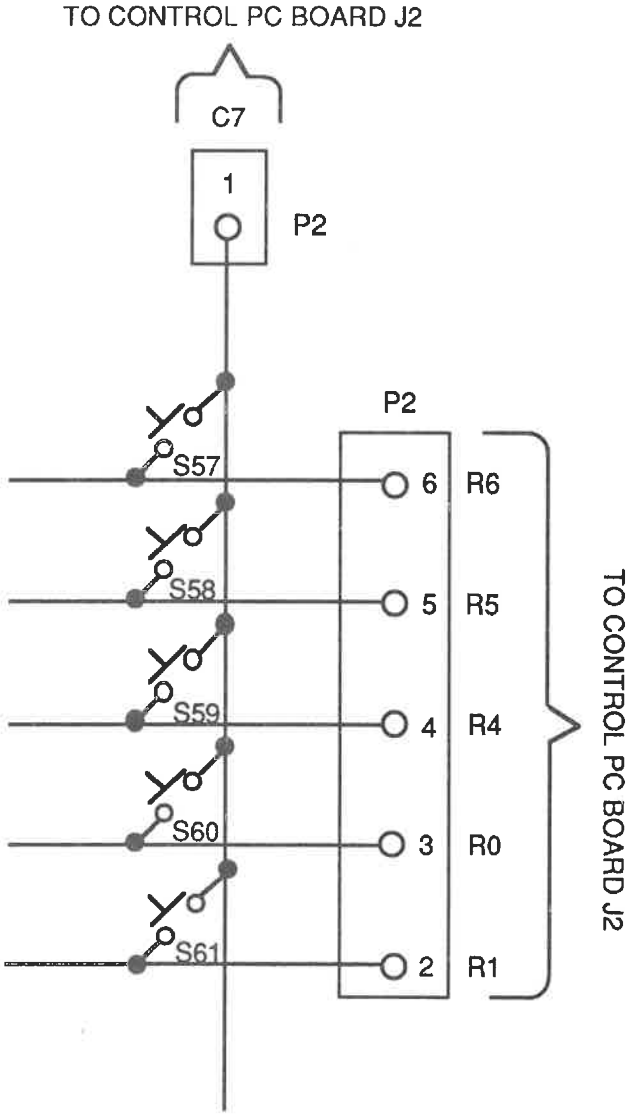
S = SWITCH

KEYBOARD MATRIX



CURSOR KEYPAD LAYOUT & MATRIX CHARTS



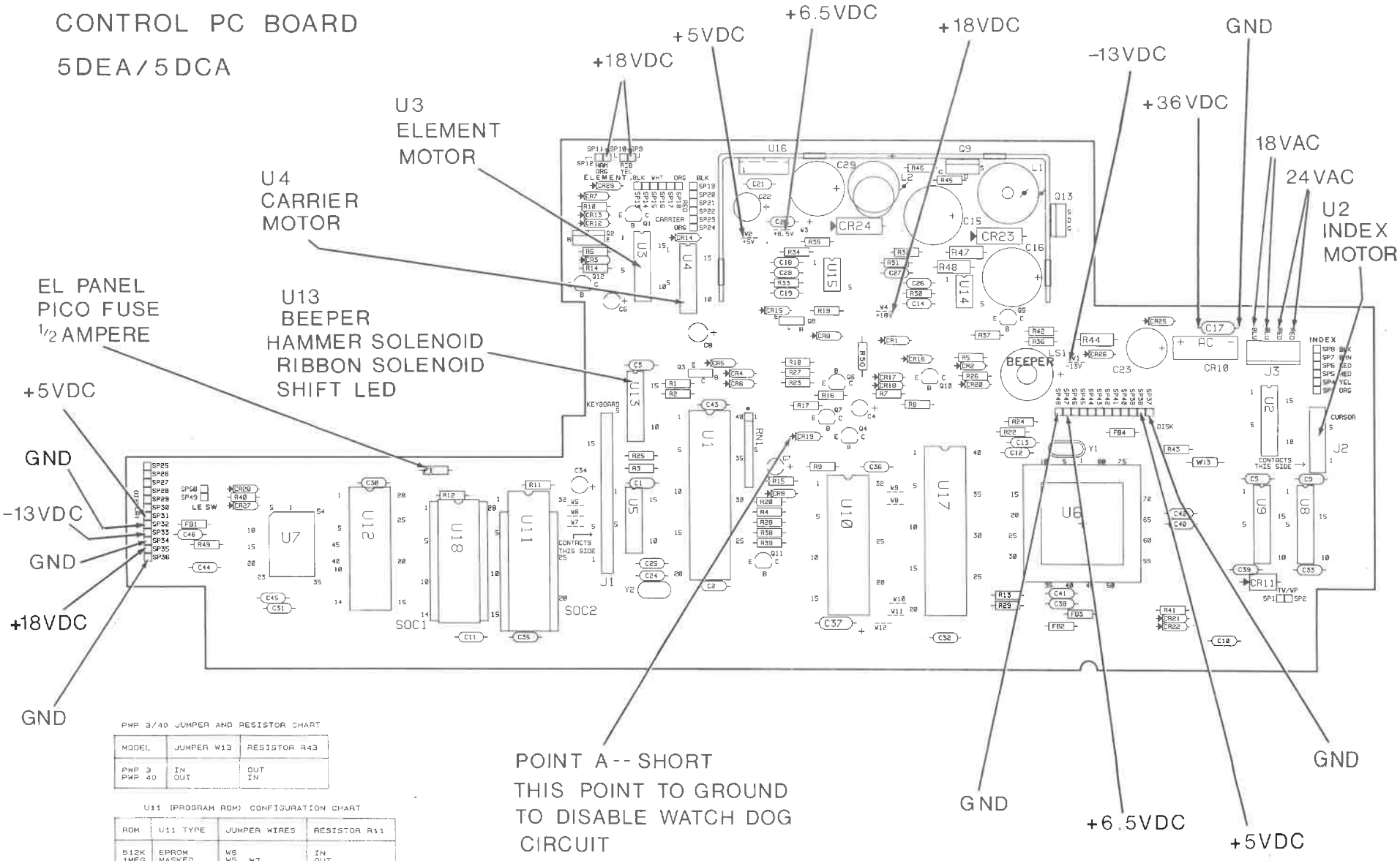


S = SWITCH
C = COLUMN
R = ROW

COMPONENT DIAGRAM

CONTROL PC BOARD

5DEA/5DCA



PWP 3/40 JUMPER AND RESISTOR CHART

MODEL	JUMPER W13	RESISTOR R43
PWP 3 PWP 40	IN OUT	OUT IN

U11 (PROGRAM ROM) CONFIGURATION CHART

ROM	U11 TYPE	JUMPER WIRES	RESISTOR R11
512K 1MEG	EPROM MASKED	W6 W5, W7	IN OUT

U10 (DICTIONARY ROM) CONFIGURATION CHART

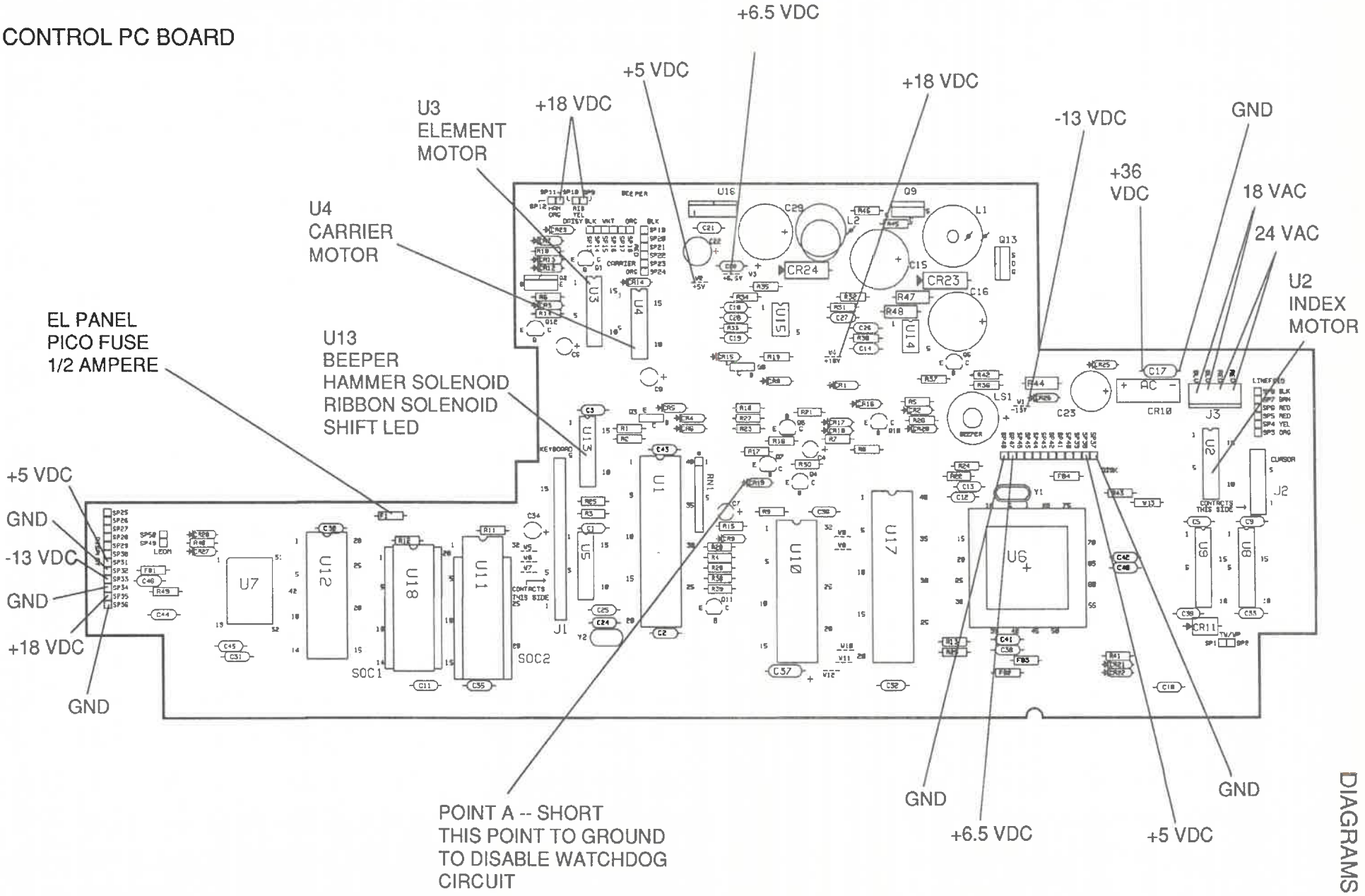
COUNTRY	U10 TYPE	JUMPER WIRES	RESISTOR R9
USA & CANADA FRENCH/CANADIAN UNITED KINGDOM	1 MEG 2 MEG 2 MEG	W9, W10, & W12 W9, W11 W9, W11	OUT IN IN

REVISED 12/88

DIAGRAMS 7C-

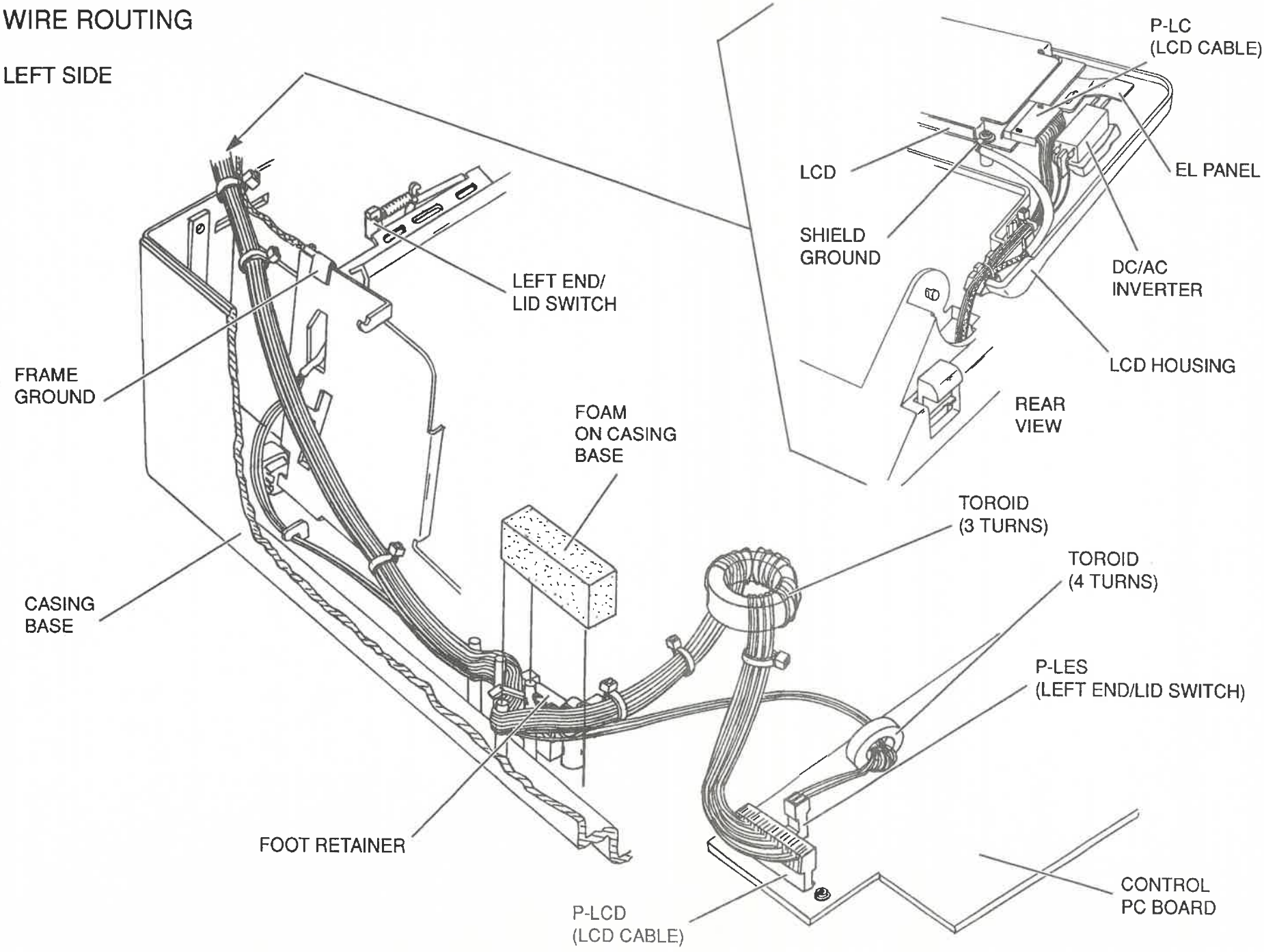
COMPONENT DIAGRAM

CONTROL PC BOARD



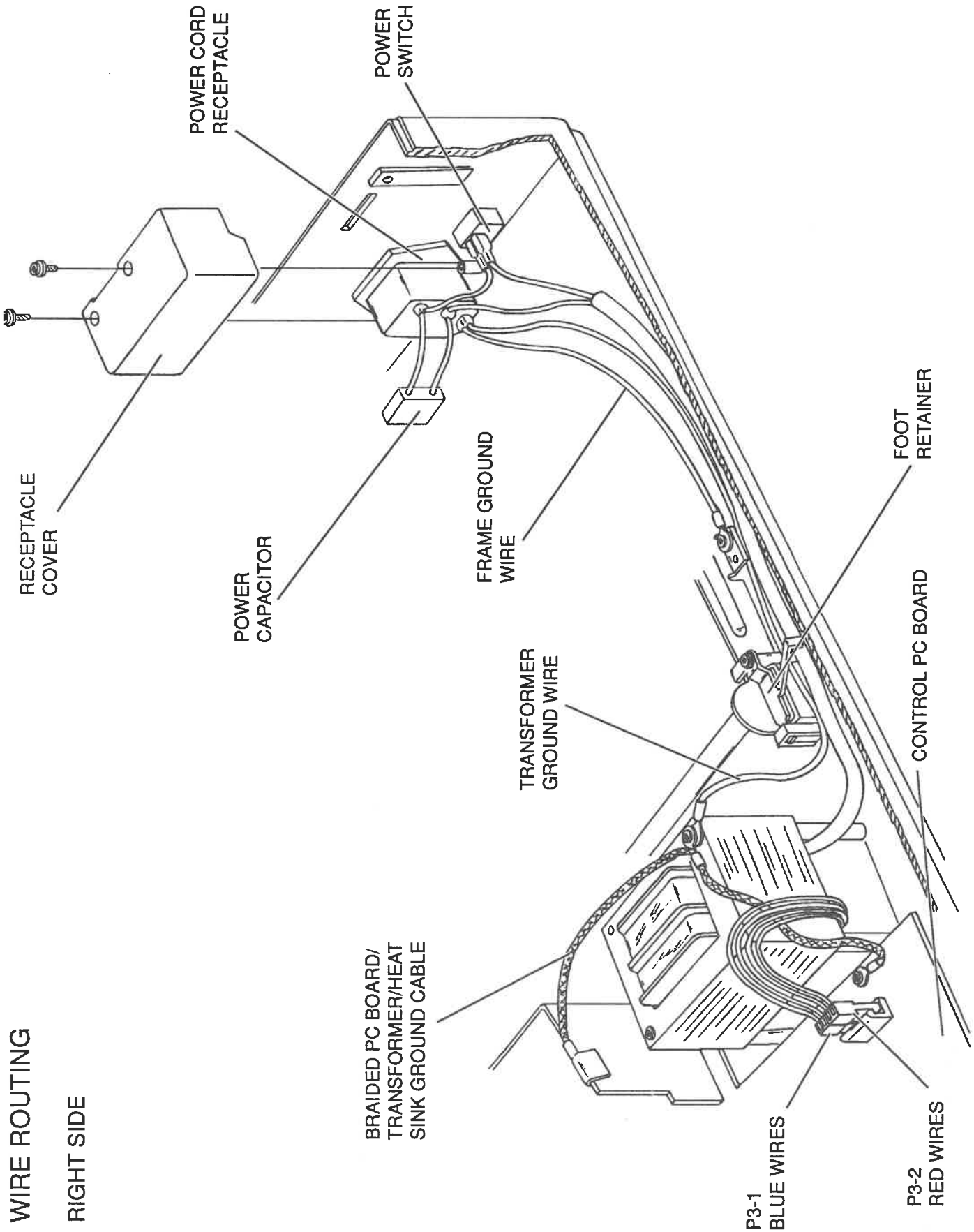
WIRE ROUTING

LEFT SIDE



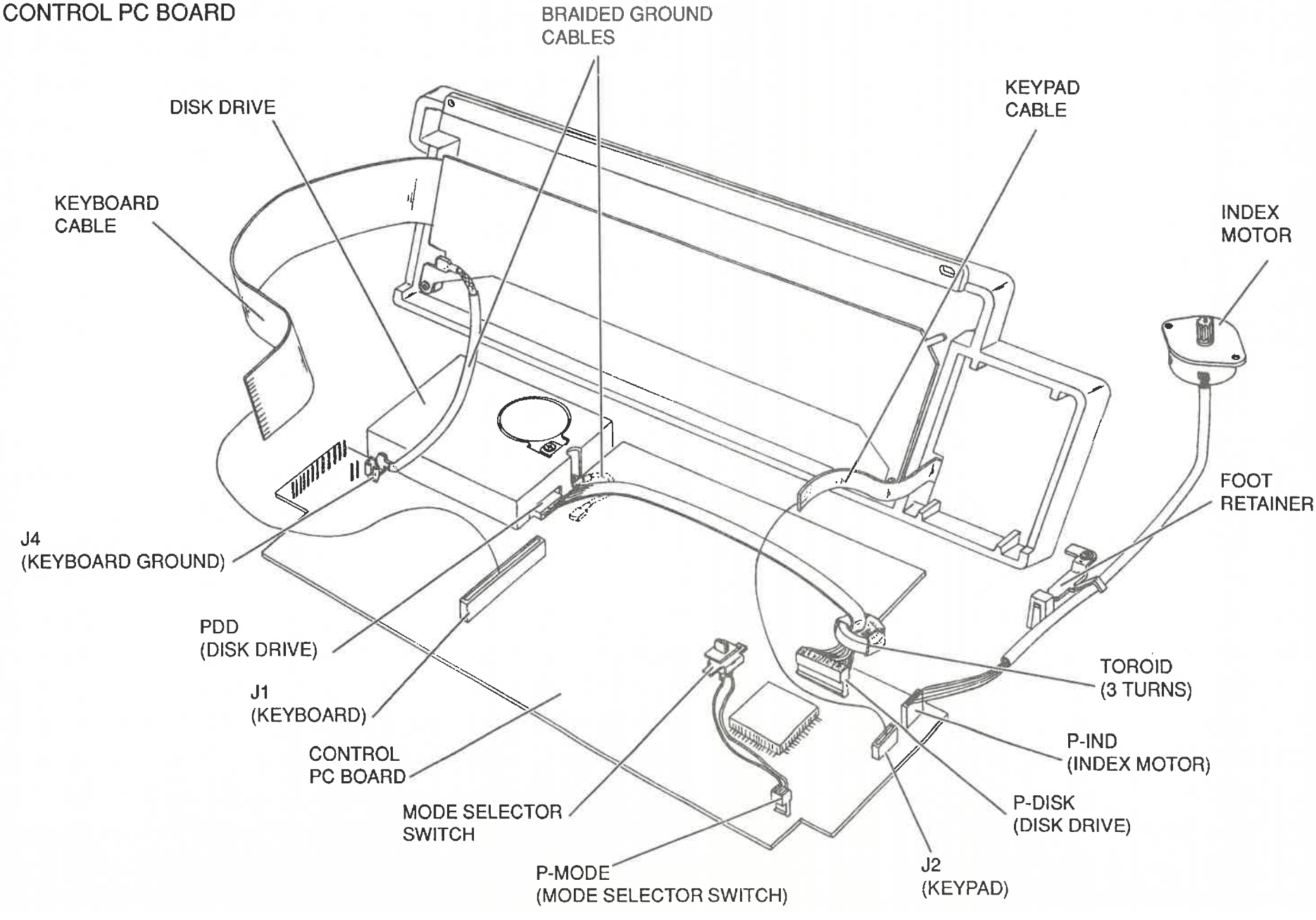
WIRE ROUTING

RIGHT SIDE



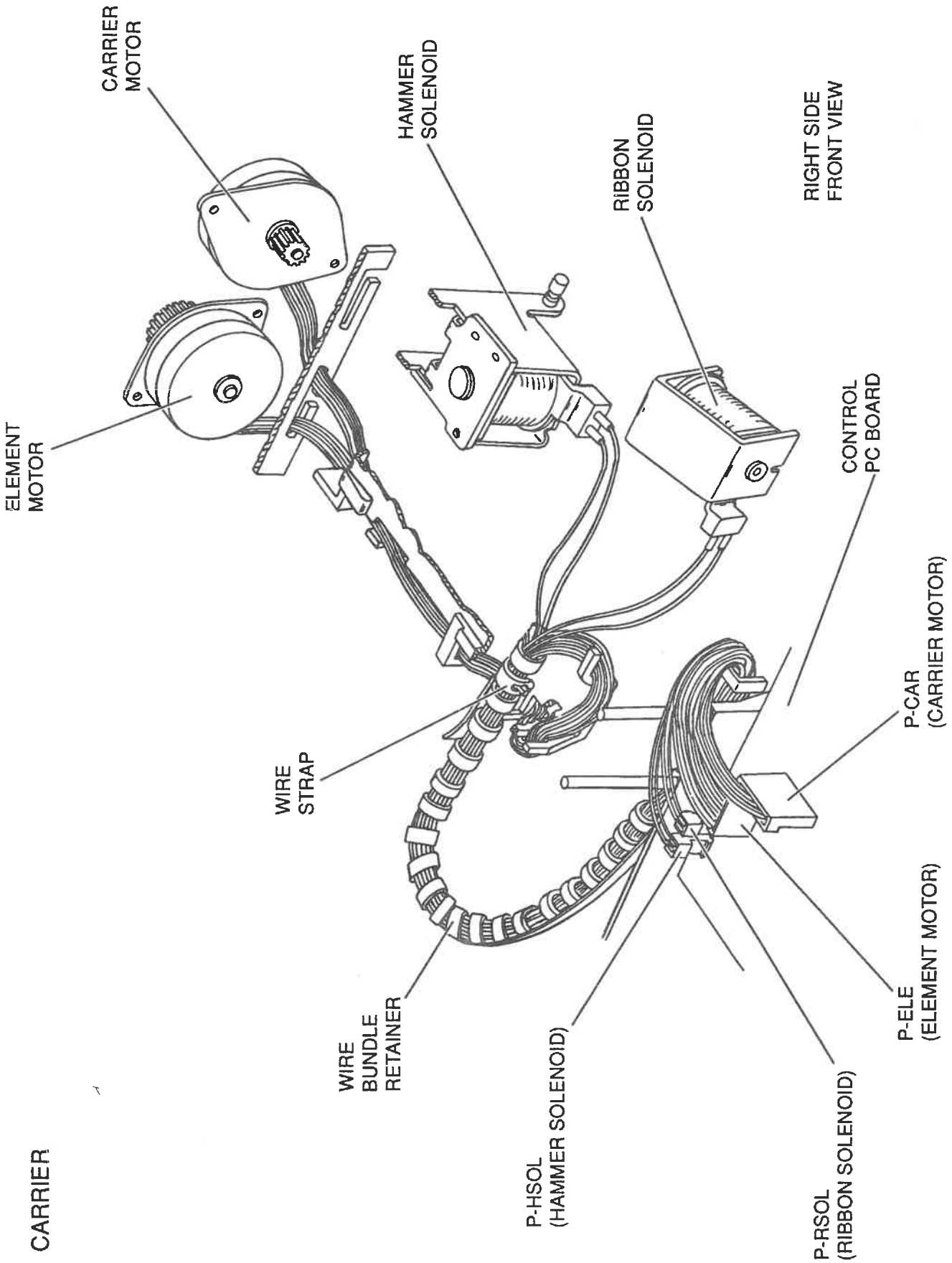
WIRE ROUTING

CONTROL PC BOARD



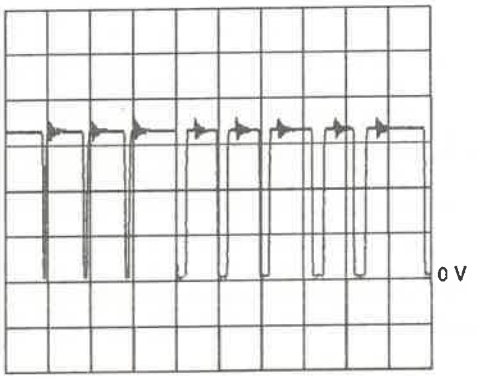
WIRE ROUTING

CARRIER

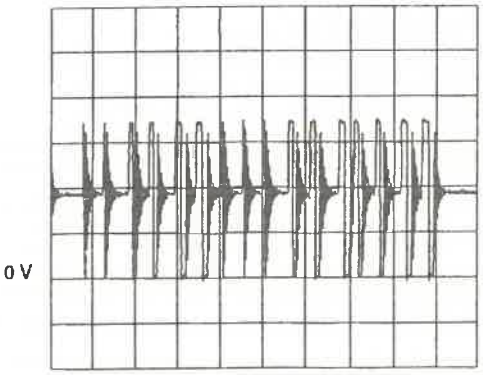


WAVE FORMS

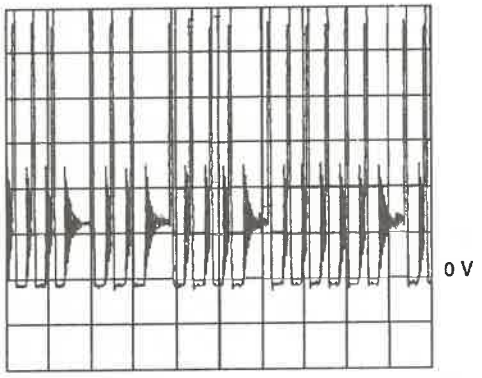
U14 PIN 6
18 VOLT REGULATOR
10 V/div 50 µsec/div



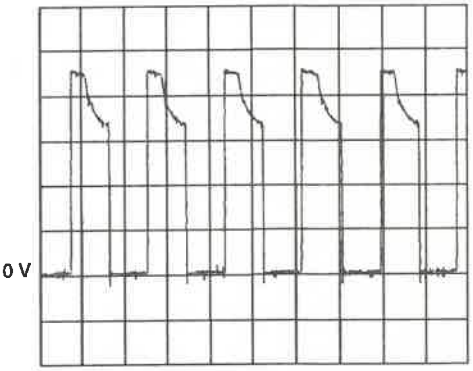
Q13 DRAIN
18 VOLT REGULATOR
10 V/div .1 msec/div



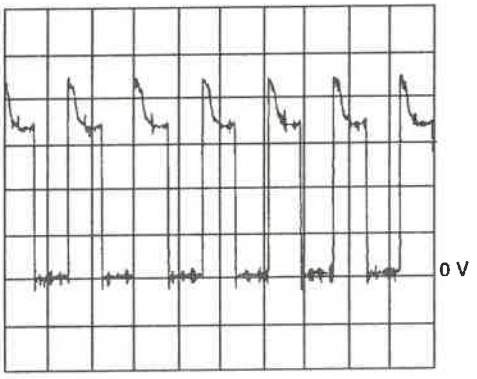
U15 PIN 6
6.5 VOLT REGULATOR
5V/div 50 µsec/div



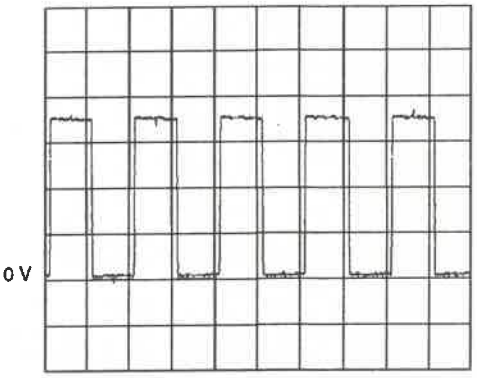
U4 PIN 1
CARRIER MOTOR PHASE A
5V/div 10 msec/div



U3 PIN 1
ELEMENT MOTOR PHASE A
5V/div 20 msec/div



U2 PIN 1
INDEX MOTOR PHASE A
5V/div 5msec/div

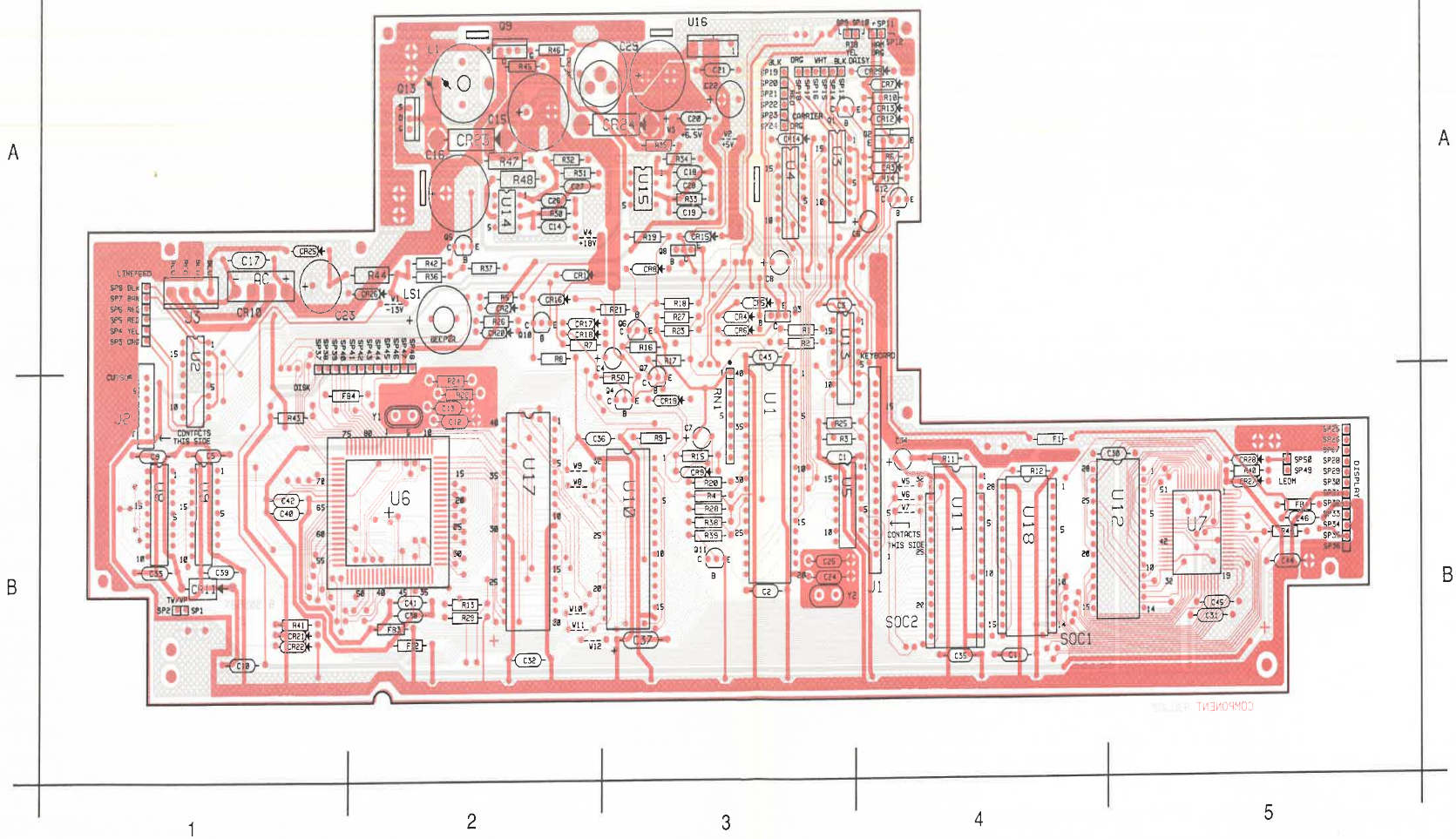


COMPONENT LAYOUT

SOLDER SIDE

COMPONENT LOCATION CHART

COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION
C1	B3	C21	A3	C41	B2	CR14	A3	FB5	B3	Q12	A4	R18	A3	R38	B3	U5	B3
C2	B3	C22	A3	C42	B1	CR15	A3	FB4	B2	Q13	A2	R19	A3	R39	B3	U6	B2
C3	A3	C23	A1	C43	B3	CR16	A2	FB3	B2			R20	B3	R42	B5	U7	B3
C4	B3	C24	B3	C44	B5	CR17	A2	FB2	B2	R1	A3	R21	A3	R41	B1	U8	B1
C5	B1	C25	B3	C45	B5	CR18	A2			R2	A3	R22	B2	R43	A2	U9	B1
C6	A4	C26	A2	C46	B5	CR19	B3	L1	A2	R3	B3	R23	A3	R43	B1	U10	B3
C7	B3	C27	A2			CR20	A2	L2	A2	R4	B3	R24	B2	R44	A2	U11	B4
C8	A3	C28	A3	CR1	A2	CR21	B1			R5	A2	R25	B3	R45	A2	U12	B4
C9	B1	C29	A3	CR2	A2	CR22	B1	LS1(BEEPER)	A2	R6	A4	R26	A2	R46	A2	U13	A3
C10	B1	C30	B4	CR3	A4	CR23	A2			R7	A2	R27	A3	R47	A2	U14	A2
C11	B4	C31	B5	CR4	A3	CR24	A3	Q1	A3	R8	B2	R28	B3	R48	A2	U15	A3
C12	B2	C32	B2	CR5	A3	CR25	A1	Q2	A4	R9	B3	R29	B2	R49	B5	U16	A3
C13	B2	C33	B1	CR6	A3	CR26	A2	Q3	A3	R10	A4	R30	A2	R50	B3	U17	B2
C14	A2	C34	B4	CR7	A4	CR27	B5	Q4	B3	R11	B4	R31	A2			U18	B4
C15	A2	C35	B4	CR8	A3	CR28	B5	Q5	A2	R12	B4	R32	A2	RN1	B3		
C16	A2	C36	B2	CR9	B3	CR29	A4	Q6	A3	R13	B2	R33	A3			W13	B1
C17	A1	C37	B3	CR10	A1			Q7	B5	R14	A4	R34	A3	U1	B3		
C18	A3	C38	B2	CR11	B1	F1	B4	Q8	A3	R15	B3	R35	A3	U2	B1	Y1	B2
C19	A3	C39	B1	CR12	A4			Q9	A2	R16	A3	R36	A2	U3	A3	Y2	B3
C20	A3	C40	B1	CR13	A4			Q10	A2	R17	B3	R37	A2	U4	A3		
								Q11	B3								

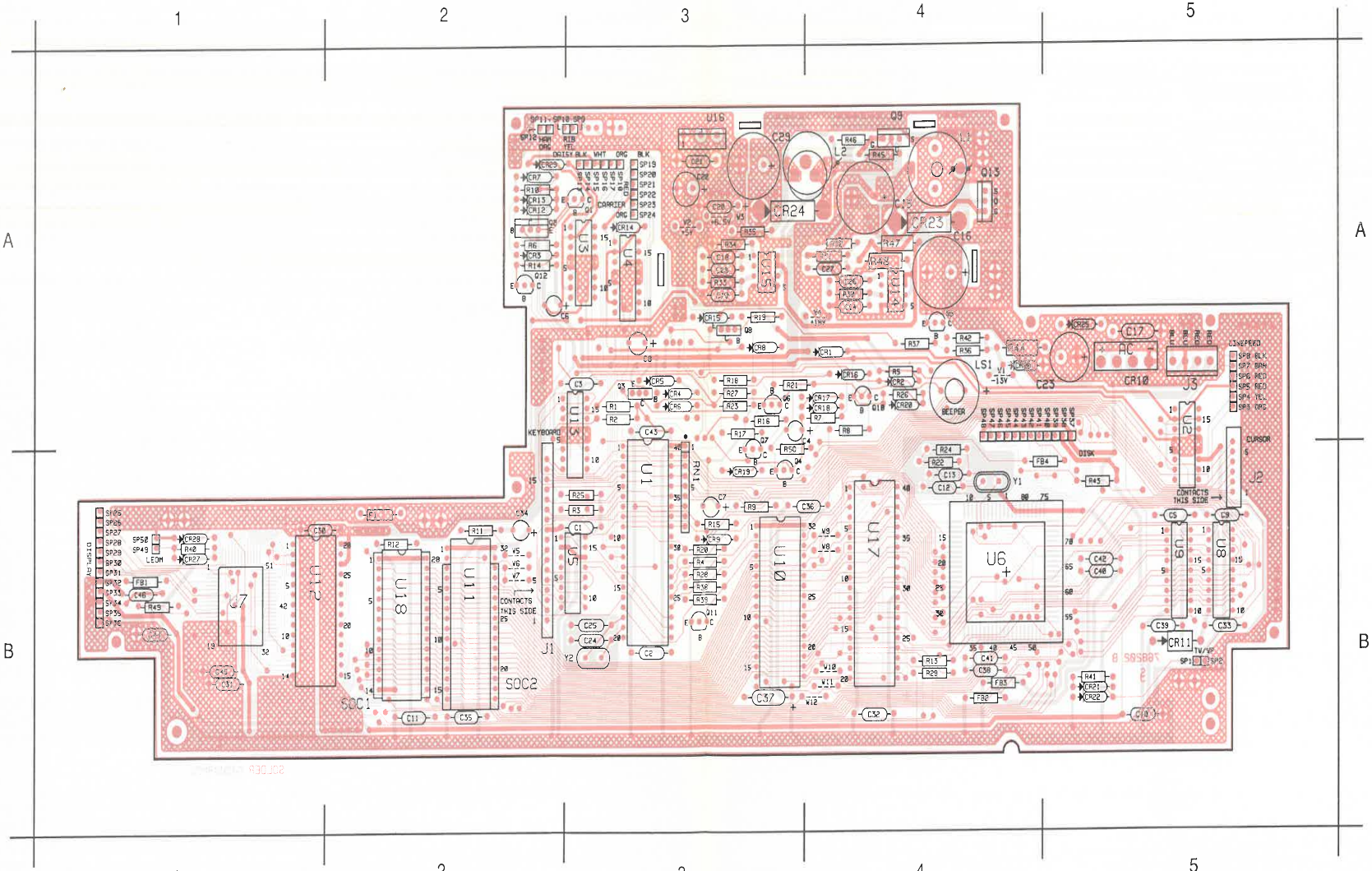


COMPONENT LAYOUT

COMPONENT SIDE

COMPONENT LOCATION CHART

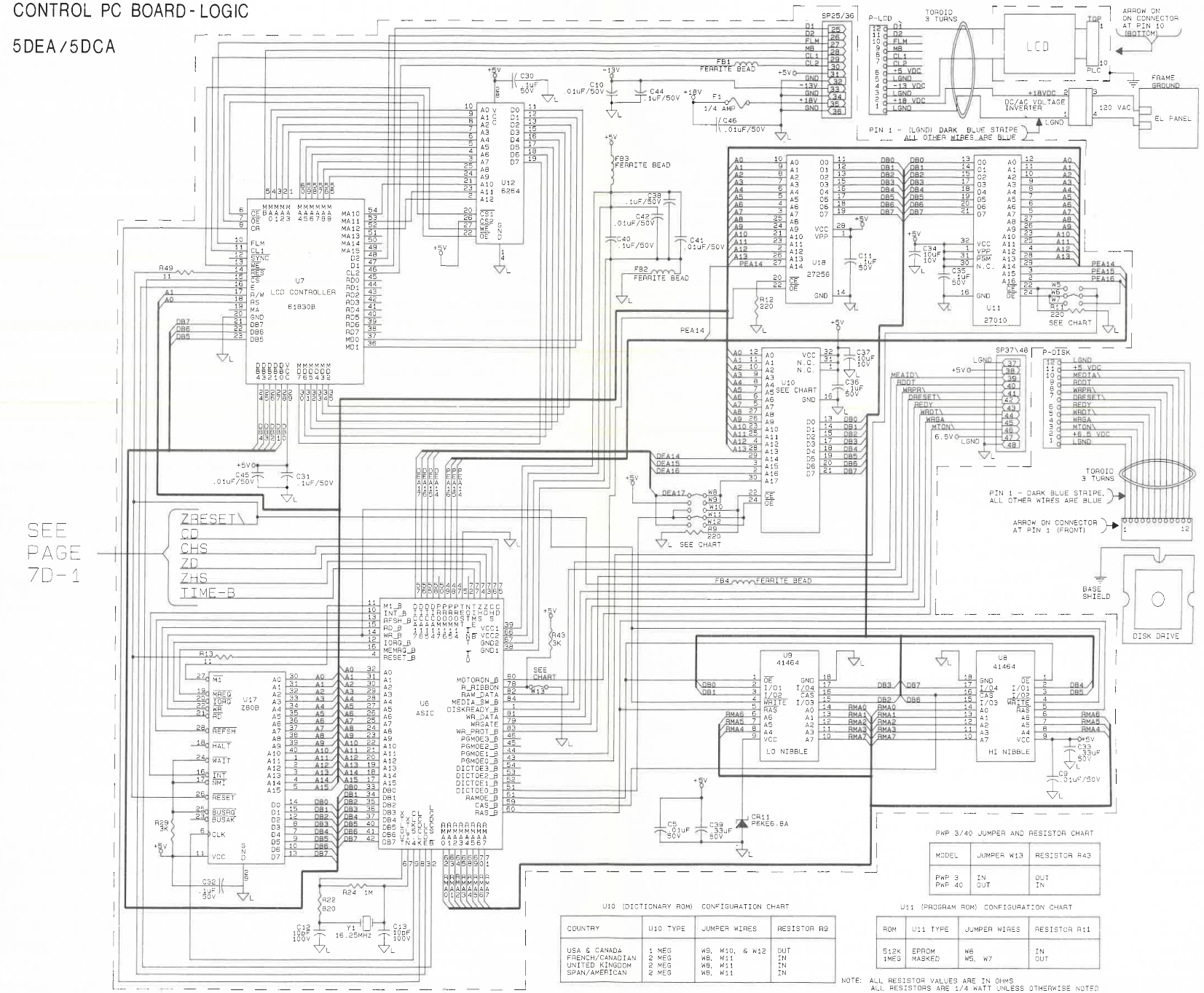
COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION
C1	B3	C21	A3	C41	B4	CR14	A3	FB1	B1	Q12	A2	R18	A3	R38	B3	U5	B3
C2	B5	C22	A3	C42	B5	CR15	A3	FB2	B4	Q13	A4	R19	A3	R39	B3	U6	B4
C3	A3	C23	A5	C43	B3	CR16	A4	FB3	B4			R20	B3	R40	B1	U7	B1
C4	B3	C24	B3	C44	B1	CR17	A4	FB4	B4	R1	A3	R21	A3	R41	B5	U8	B5
C5	B5	C25	B5	C45	B1	CR18	A4			R2	A3	R22	B4	R42	A4	U9	B5
C6	A2	C26	A4	C46	B1	CR19	B3	L1	A4	R3	A3	R23	A3	R43	B5	U10	B3
C7	B3	C27	A4			CR20	A4	L2	A4	R4	B3	R24	B4	R44	A4	U11	B2
C8	A3	C28	A3	CR1	A4	CR21	B5			R5	A4	R25	B3	R45	A4	U12	B2
C9	B5	C29	A3	CR2	A4	CR22	B5	LS1(BEEPER)	A4	R6	A2	R26	A4	R46	A4	U13	A3
C10	B5	C30	B2	CR3	A2	CR23	A4			R7	A4	R27	A3	R47	A4	U14	A4
C11	B2	C31	B1	CR4	A3	CR24	A3	Q1	A3	R8	B4	R28	B5	R48	A4	U15	A3
C12	B4	C32	B4	CR5	A3	CR25	A5	Q2	A2	R9	B3	R29	B4	R49	B1	U16	A3
C13	B4	C33	B5	CR6	A3	CR26	A4	Q3	A3	R10	A2	R30	A4	R50	B3	U17	B4
C14	A4	C34	B2	CR7	A2	CR27	B1	Q4	B3	R11	B2	R31	A4			U18	B2
C15	A4	C35	B2	CR8	A3	CR28	B1	Q5	A4	R12	B2	R32	A4	RN1	B5		
C16	A4	C36	B4	CR9	B3	CR29	A2	Q6	A3	R13	B4	R33	A3			W13	B5
C17	A5	C37	B3	CR10	A5			Q7	B3	R14	A2	R34	A3	U1	B3		
C18	A3	C38	B4	CR11	B5	F1	B2	Q8	A4	R15	B3	R35	A3	U2	B5	Y1	B4
C19	A3	C39	B5	CR12	A2			Q9	A4	R16	A3	R36	A4	U3	A3	Y2	B3
C20	A3	C40	B5	CR13	A2			Q10	B3	R17	B3	R37	A4	U4	A3		



SCHEMATIC DIAGRAM

CONTROL PC BOARD - LOGIC

5DEA/5DCA



PWP 3/40 JUMPER AND RESISTOR CHART

MODEL	JUMPER W13	RESISTOR R43
PWP 3 PWP 40	IN OUT	OUT IN

U10 (DICTIONARY ROM) CONFIGURATION CHART

COUNTRY	U10 TYPE	JUMPER WIRES	RESISTOR R9
USA & CANADA FRENCH/CANADIAN UNITED KINGDOM SPAN/AMERICAN	1 MEG 2 MEG 2 MEG 2 MEG	W9, W10, & W12 W8, W11 W8, W11 W8, W11	OUT IN IN IN

U11 (PROGRAM ROM) CONFIGURATION CHART

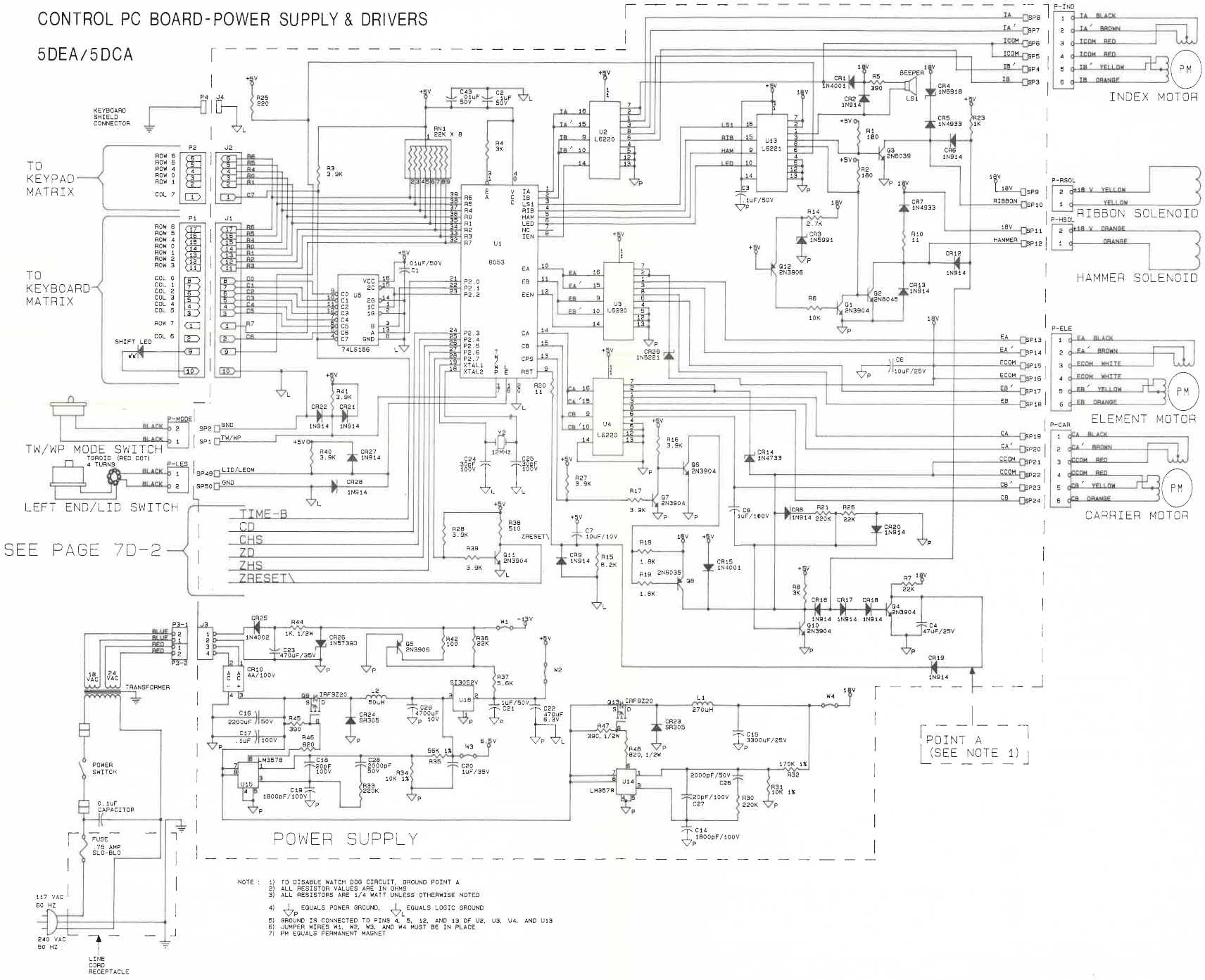
ROM	U11 TYPE	JUMPER WIRES	RESISTOR R11
512K 1MEG	EPROM MASKED	W8 W5, W7	IN OUT

NOTE: ALL RESISTOR VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE NOTED

SCHEMATIC DIAGRAM

CONTROL PC BOARD-POWER SUPPLY & DRIVERS

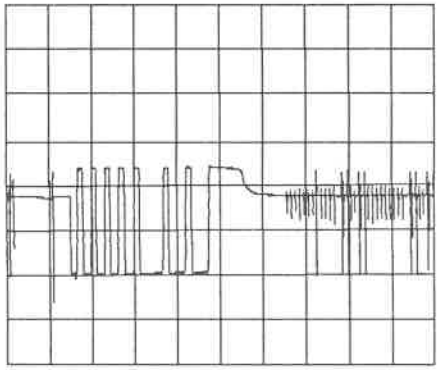
5DEA/5DCA



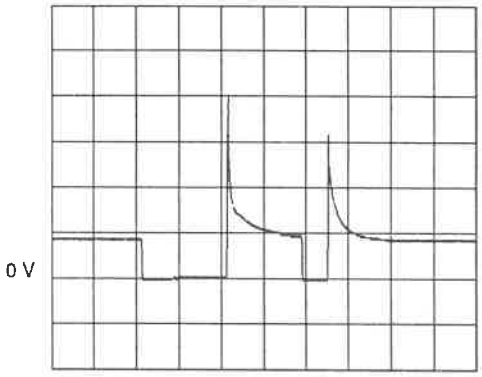
NOTE :
1) TO DISABLE WATCH DOG CIRCUIT, GROUND POINT A
2) ALL RESISTOR VALUES ARE IN OHMS
3) ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE NOTED
4) ⏚P EQUALS POWER GROUND, ⏚L EQUALS LOGIC GROUND
5) GROUND IS CONNECTED TO PINS 4, 5, 12, AND 13 OF U2, U3, U4, AND U13
6) JUMPER WIRES W1, W2, W3, AND W4 MUST BE IN PLACE
7) PM EQUALS PERMANENT MAGNET

WAVE FORMS

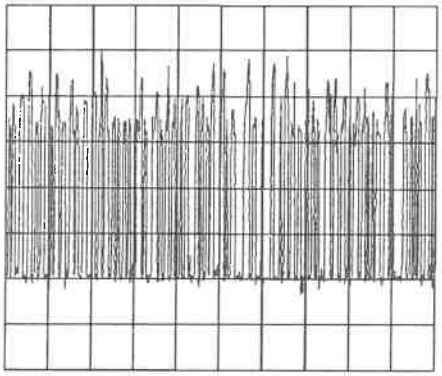
Q3 COLLECTOR
RIBBON SOLENOID PULSE
10 V/div 10 msec/div



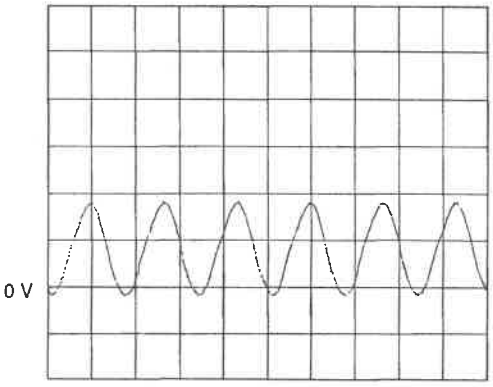
Q2 DRAIN
HAMMER SOLENOID PULSE
20 V/div 2msec/div



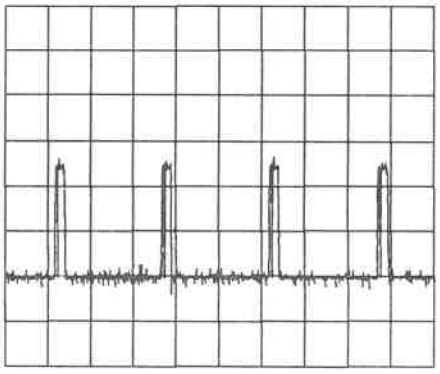
U17 PIN 14
DATA BIT 0
1V/div 50 µsec/div



U2 PIN 19
CRYSTAL OSCILLATOR
2V/div .05 µsec/div



U5 PIN 9
KEYBOARD SCANNING*
ROW 6
2 V/div 2 msec/div



* When Key Switch is actuated.

SECTION 8

DIAGRAMS -- Revision B Electronics

Page Number

8A KEYBOARD DIAGRAMS

(Refer to Keyboard and Keypad Layout Chart and Matrix in Section 7)

Keyboard Layout Chart 7A-2

Keyboard Matrix 7A-3

Cursor Keypad Layout & Matrix Charts 7A-4

8B WIRE ROUTING

Left Side 8B-1

Right Side 8B-2

Control PC Board 8B-3

Carrier 8B-4

8C WAVE FORMS 8C-1
8C-2

8D WIRING DIAGRAM 8D-1

8E COMPONENT DIAGRAMS

Control PC Board -- Component Location 8E-1

Control PC Board -- Component Layout 8E-2

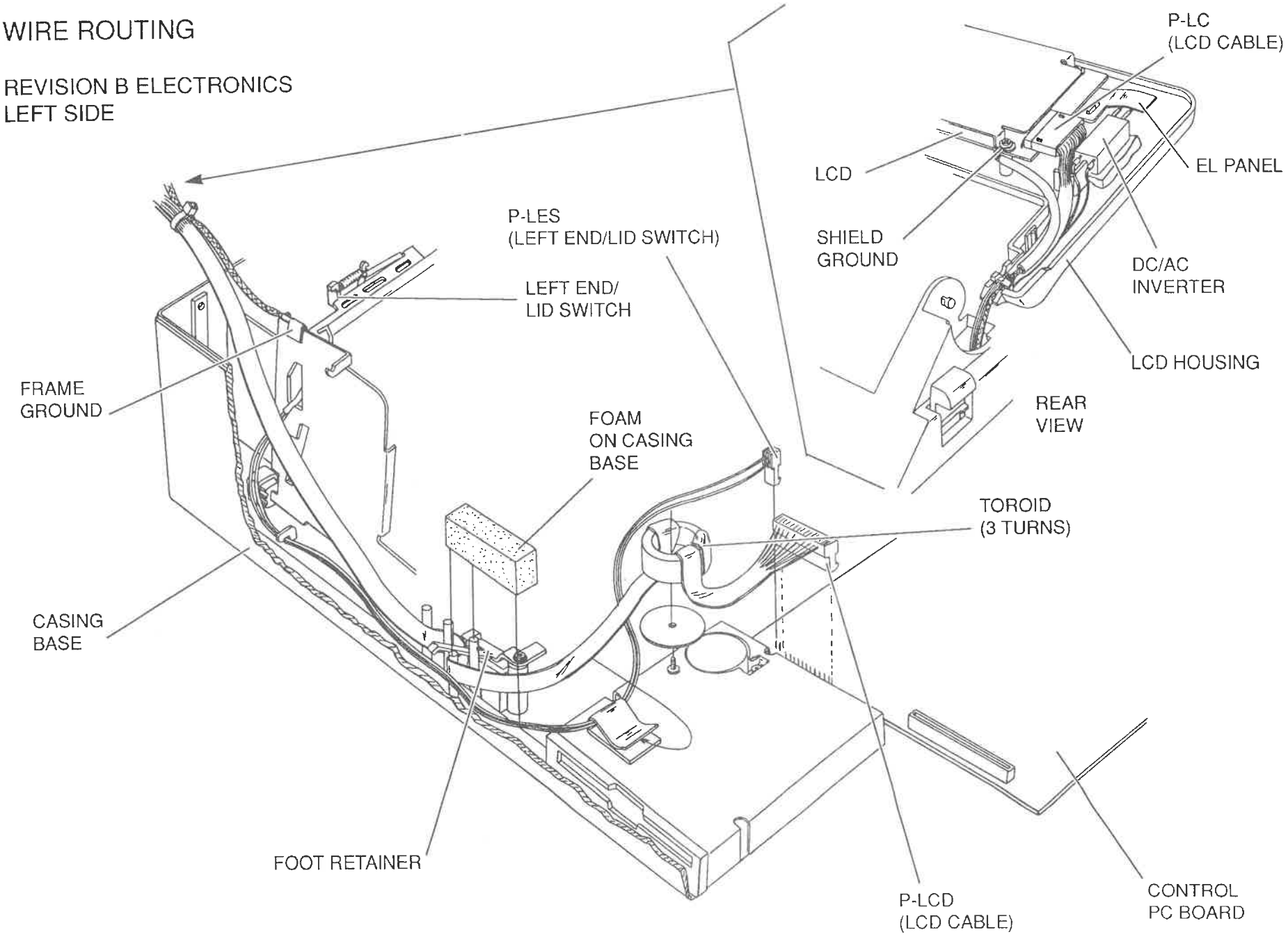
8F SCHEMATIC DIAGRAMS

Control PC Board -- Power Supply, Drivers 8F-1

Control PC Board -- Logic, RAM, ROM 8F-2

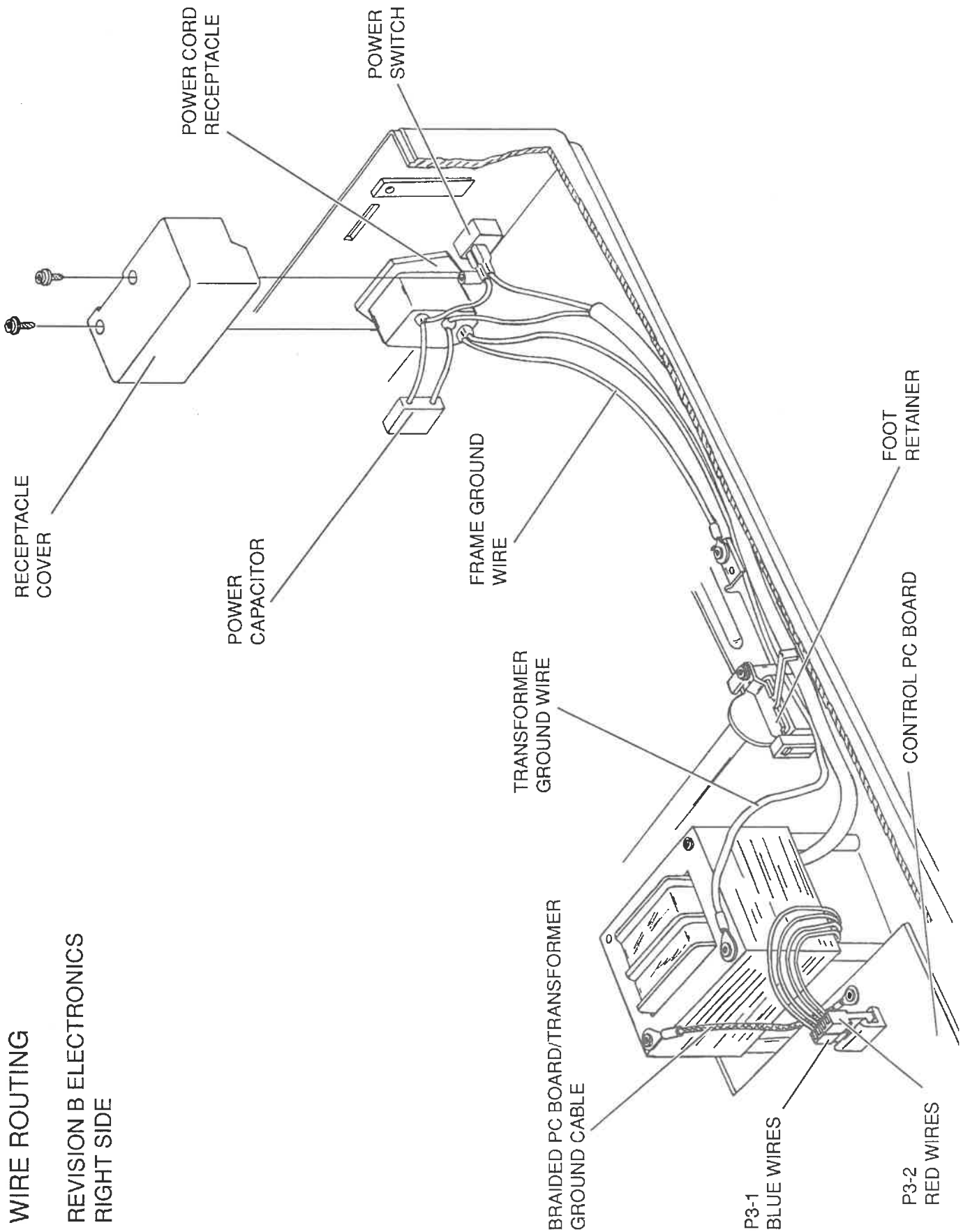
WIRE ROUTING

REVISION B ELECTRONICS
LEFT SIDE



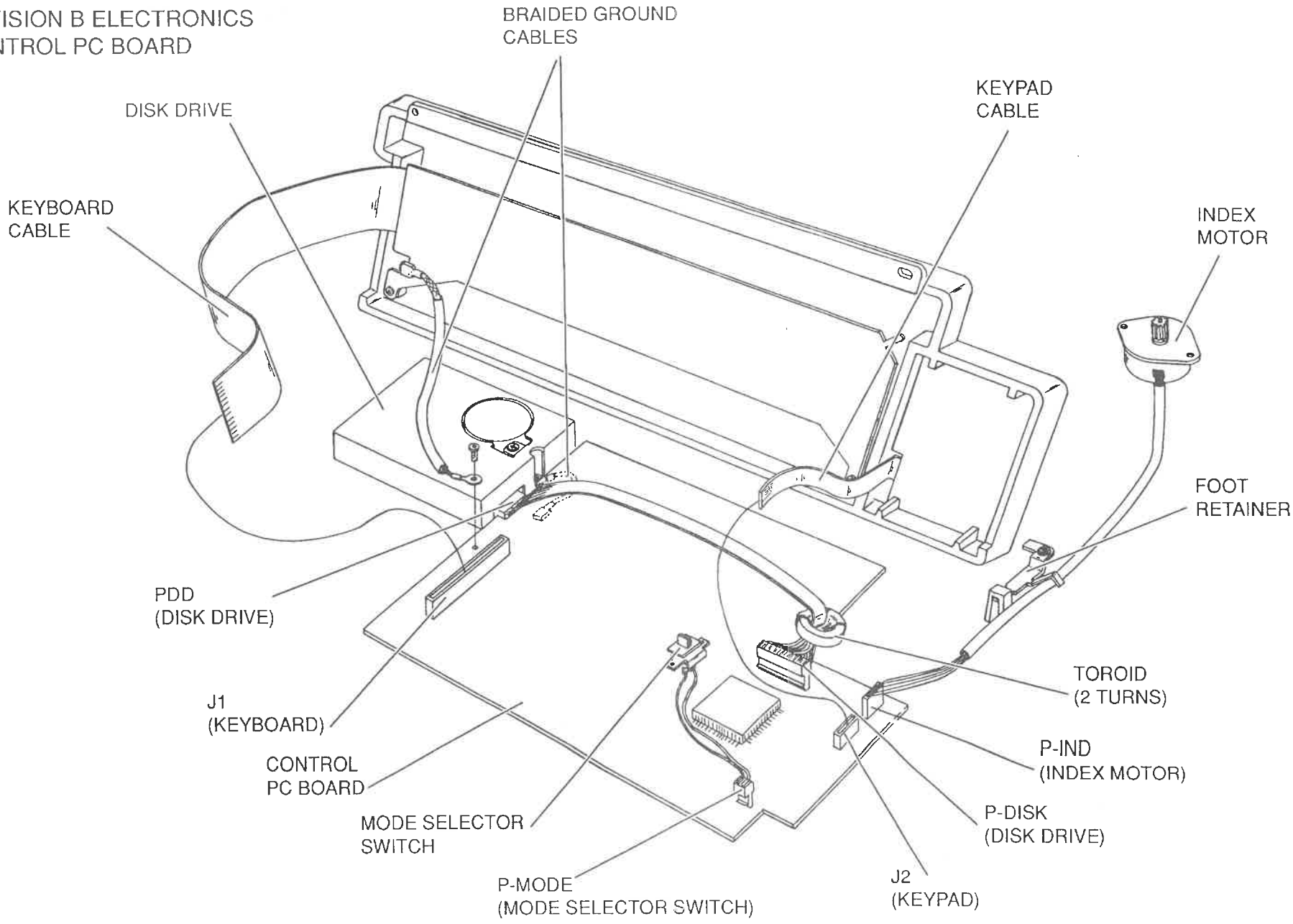
WIRE ROUTING

REVISION B ELECTRONICS
RIGHT SIDE



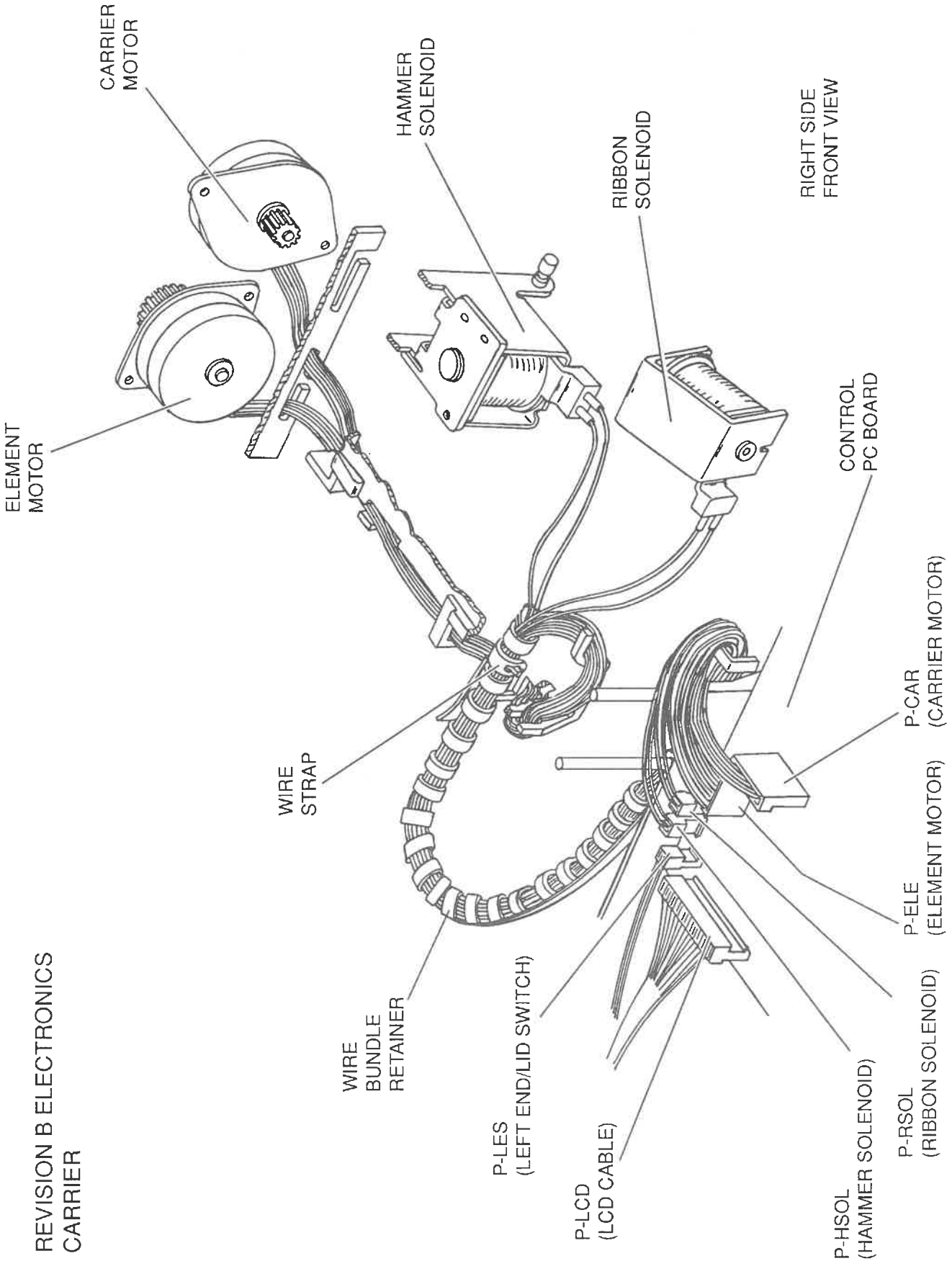
WIRE ROUTING

REVISION B ELECTRONICS CONTROL PC BOARD



WIRE ROUTING

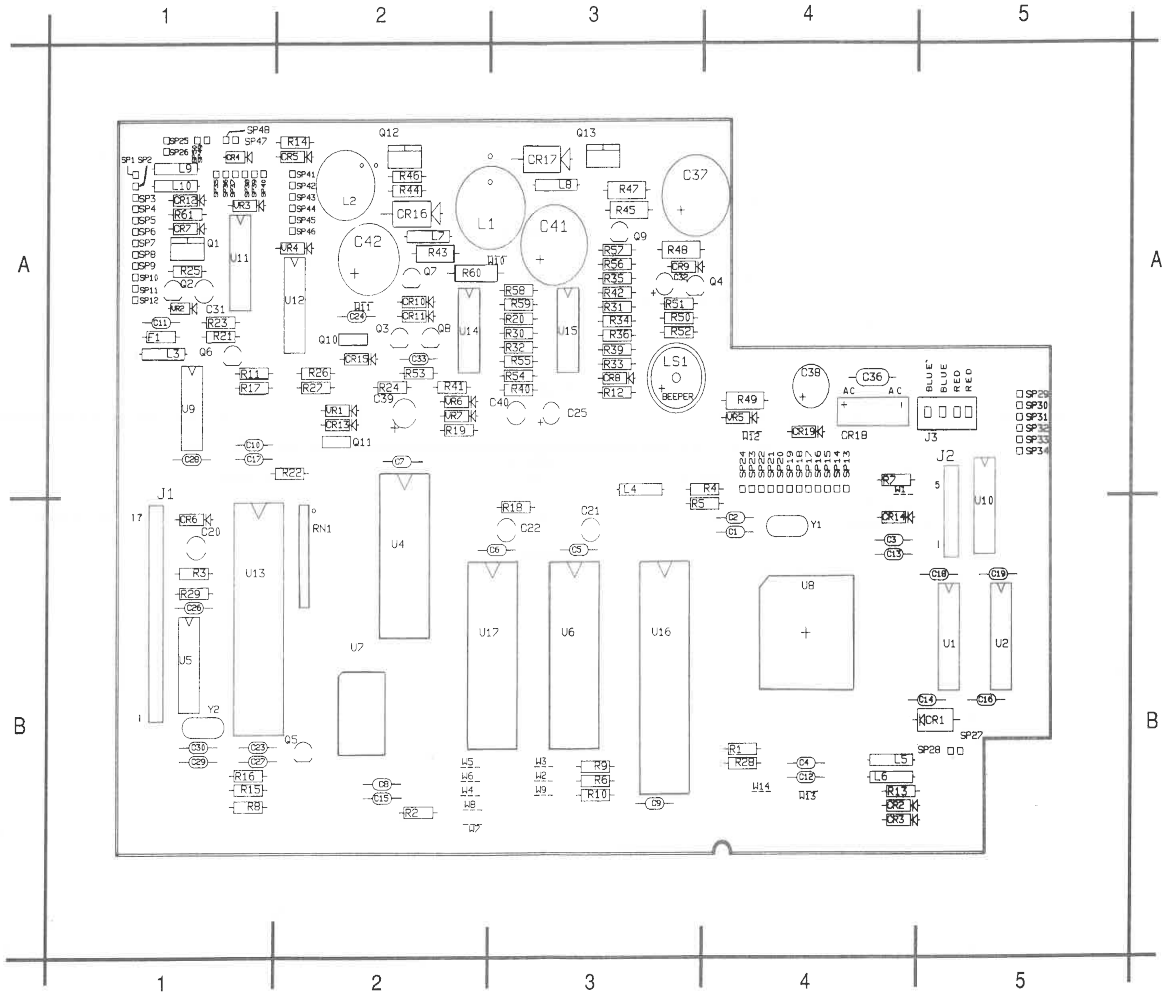
REVISION B ELECTRONICS CARRIER



COMPONENT DIAGRAM

COMPONENT LOCATION

REVISION B ELECTRONICS

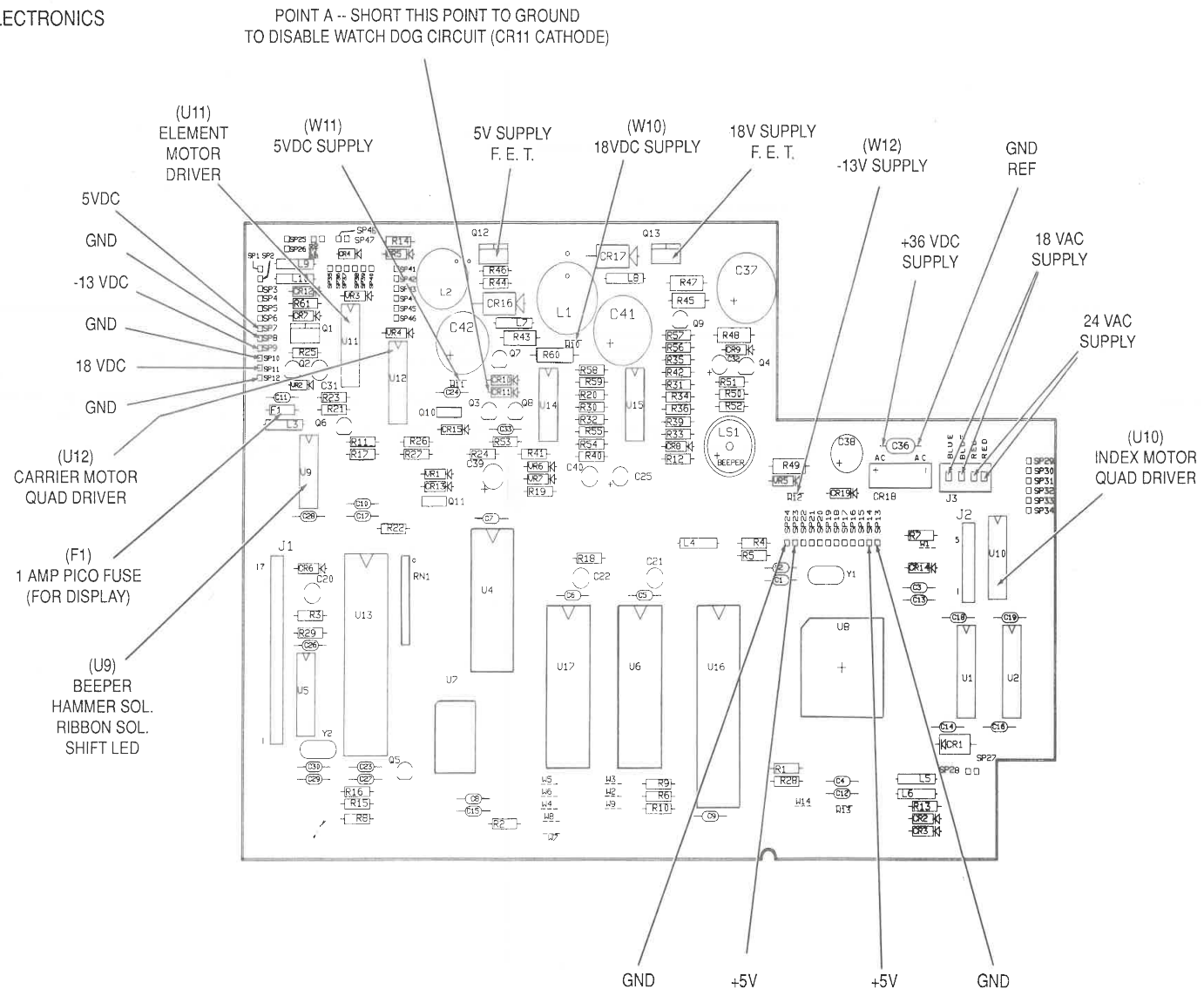


COMPONENT LOCATION CHART

COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION	COMPONENT	LOCATION
C1	B4	C21	B3	CR1	B5	F1	A1	Q6	A1	R12	A3	R32	A3	R54	A3	U10	B5
C2	B4	C22	B3	CR2	B4			Q7	A2	R13	B4	R33	A3	R55	A3	U11	A1
C3	B4	C23	B1	CR3	B4	LS1(BEEPER)	A3	Q8	A2	R14	A2	R34	A3	R56	A3	U12	A2
C4	B4	C24	A2	CR4	A1			Q9	A3	R15	B1	R35	A3	R57	A3	U13	B1
C5	B3	C25	A3	CR5	A2	L1	A3	Q10	A2	R16	B1	R36	A3	R58	A3	U14	A2
C6	B3	C26	B1	CR6	B1	L2	A2	Q11	A2	R17	A1	R39	A3	R59	A3	U15	A3
C7	A2	C27	B1	CR7	A1	L3	A1	Q12	A2	R18	B3	R40	A3	R60	A2	U16	B3
C8	B2	C28	A1	CR8	A3	L4	B3	Q13	A3	R19	A2	R41	A2	R61	A1	U17	B3
C9	B3	C29	B1	CR9	A3	L5	B4			R20	A3	R42	A3				
C10	A1	C30	B1	CR10	A2	L6	B4	R1	B4	R21	A1	R43	A2	RN1	B2	Y1	B4
C11	A1	C31	A1	CR11	A2	L7	A2	R2	B2	R22	A2	R44	A2			Y2	B1
C12	B4	C32	A3	CR12	A1	L8	A3	R3	B1	R23	A1	R45	A3				
C13	B4	C33	A2	CR13	A2	L9	A1	R4	B4	R24	A2	R46	A2	U1	B5		
C14	B5	C36	A4	CR14	B4	L10	A1	R5	B4	R25	A1	R47	A3	U2	B5		
C15	B2	C37	A3	CR15	A2			R6	B3	R26	A2	R48	A3	U4	B2		
C16	B4	C38	A4	CR16	A2	Q1	A1	R7	A4	R27	A2	R49	A4	U5	B1		
C17	A1	C39	A2	CR17	A3	Q2	A1	R8	B1	R28	B4	R50	A3	U6	B3		
C18	B5	C40	A3	CR18	A4	Q3	A2	R9	B3	R29	B1	R51	A3	U7	B2		
C19	B5	C41	A3	CR19	A4	Q4	A3	R10	B3	R30	A3	R52	A3	U8	B4		
C20	B1	C42	A2			Q5	B2	R11	A1	R31	A3	R53	A2	U9	A1		

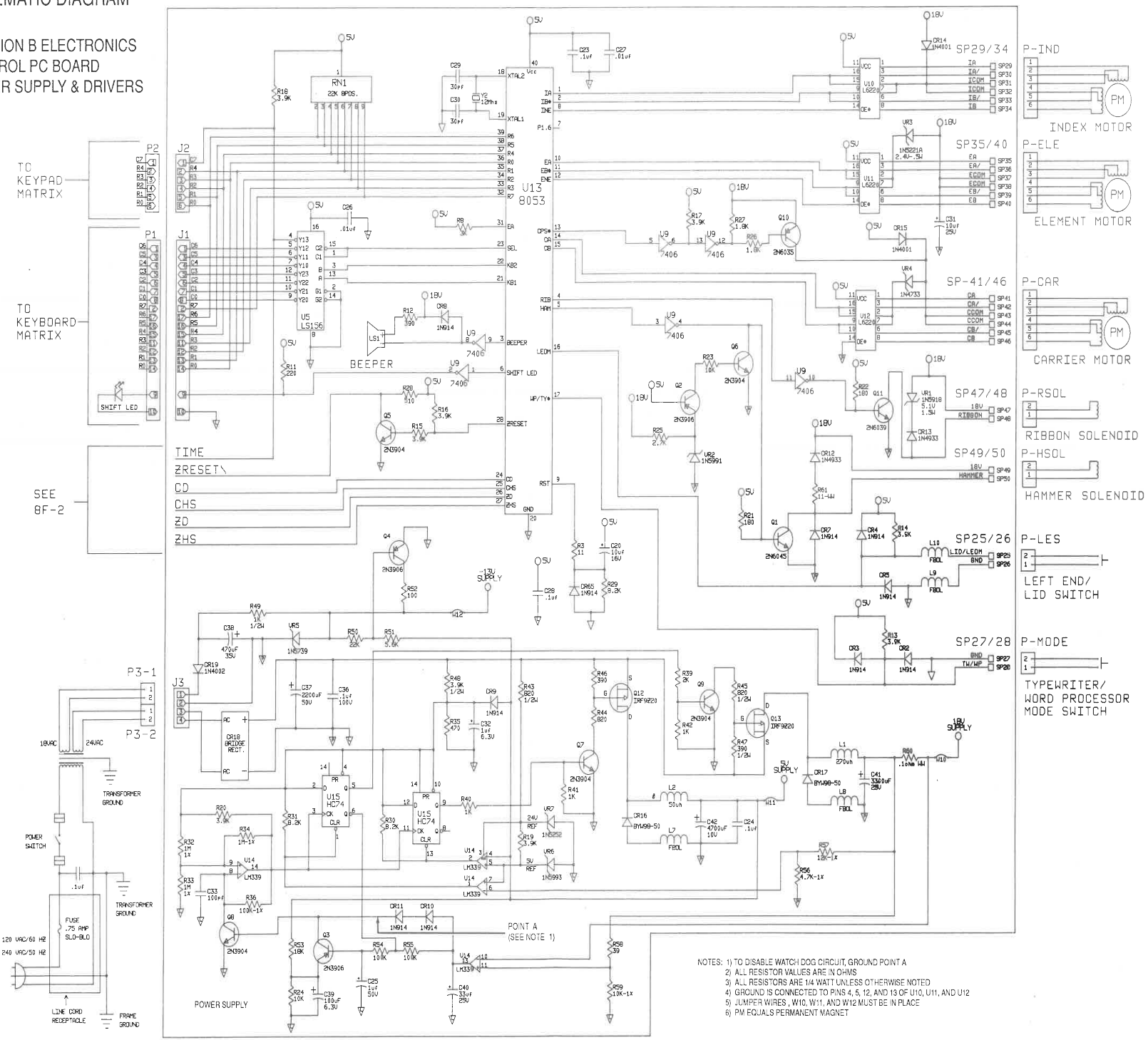
COMPONENT DIAGRAM

COMPONENT LAYOUT
REVISION B ELECTRONICS



SCHEMATIC DIAGRAM

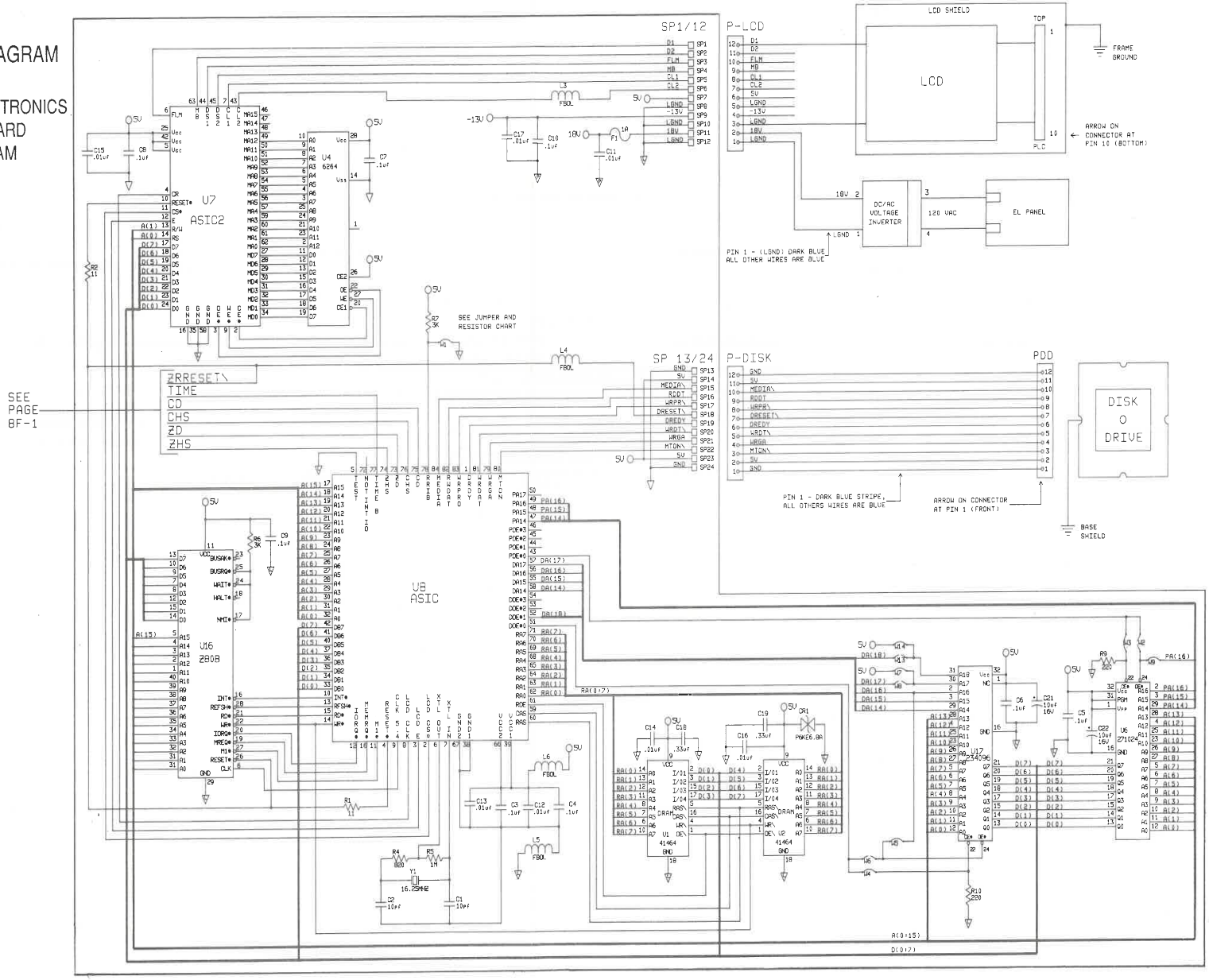
REVISION B ELECTRONICS
CONTROL PC BOARD
POWER SUPPLY & DRIVERS



NOTES:
1) TO DISABLE WATCH DOG CIRCUIT, GROUND POINT A
2) ALL RESISTOR VALUES ARE IN OHMS
3) ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE NOTED
4) GROUND IS CONNECTED TO PINS 4, 5, 12, AND 13 OF U10, U11, AND U12
5) JUMPER WIRES , W10, W11, AND W12 MUST BE IN PLACE
6) PM EQUALS PERMANENT MAGNET

SCHEMATIC DIAGRAM

REVISION B ELECTRONICS
CONTROL PC BOARD
LOGIC, ROM, & RAM



PWP3 SERIES/2000 JUMPER AND RESISTOR CHART

MODEL	JUMPER W1	RESISTOR R7
PWP3 SERIES	IN	OUT
PWP 2000	OUT	IN

DICTIONARY ROM CONFIGURATION CHART

U17	W4	W5	W6	W7	W8	W13	W14	R10
1 MEG EPROM	OUT	OUT	IN	IN	OUT	OUT	IN	IN
1 MEG ROM	IN	IN	OUT	IN	OUT	OUT	IN	OUT
2 MEG ROM	OUT	OUT	IN	OUT	IN	OUT	IN	IN
4 MEG ROM	OUT	OUT	IN	OUT	IN	IN	OUT	IN

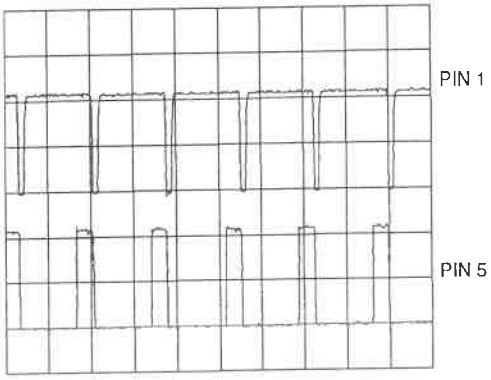
PROGRAM ROM CONFIGURATION CHART

U6	W2	W3	W9	R9
1 MEG EPROM	IN	OUT	OUT	IN
1 MEG ROM	OUT	IN	IN	OUT

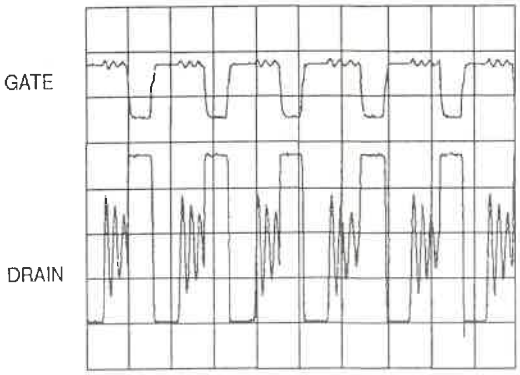
WAVE FORMS

REVISION B ELECTRONICS

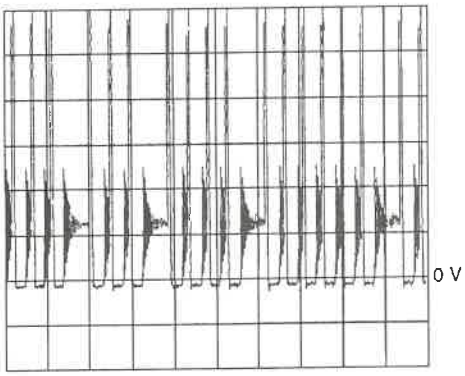
U14 PIN 1,U15 PIN 5
18 VOLT REGULATOR
2 V/div 10 µsec/div



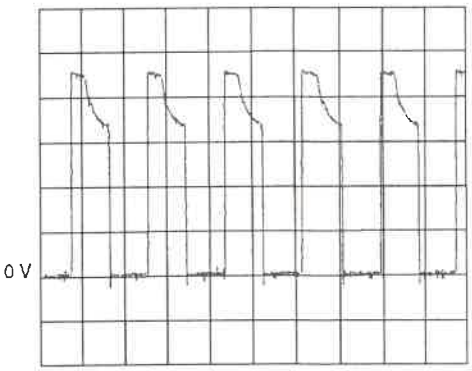
Q13 GATE & DRAIN
18 VOLT REGULATOR
10 V/div 10 µsec/div



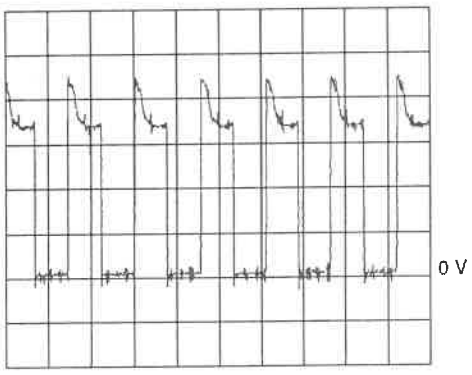
Q12 DRAIN
5 VOLT REGULATOR
5V/div 50 µsec/div



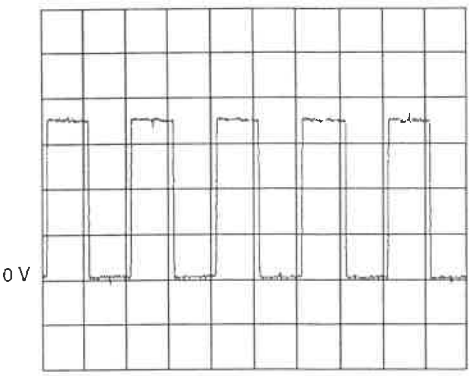
U12 PIN 1
CARRIER MOTOR PHASE A
5V/div 10 msec/div



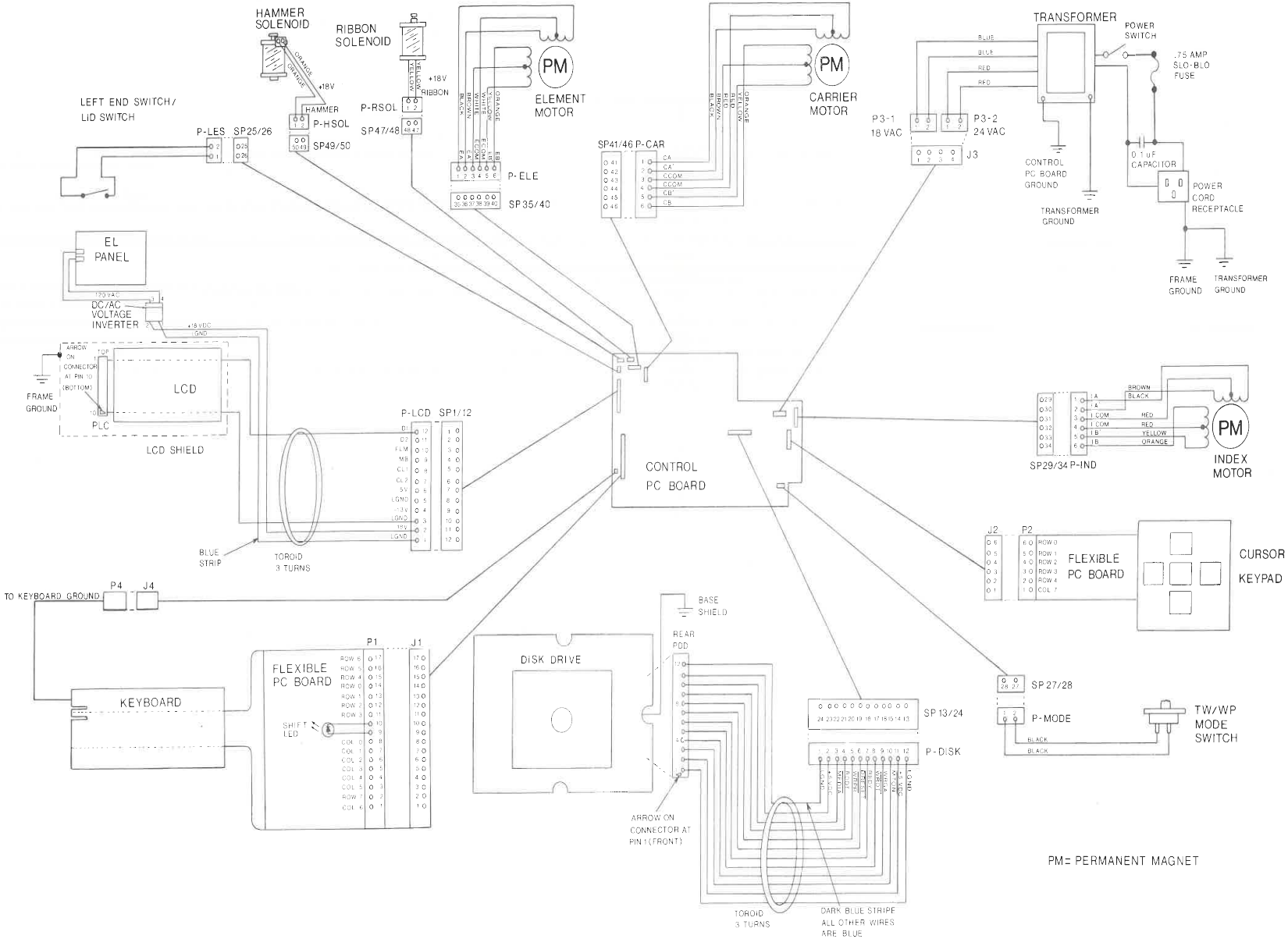
U11 PIN 1
ELEMENT MOTOR PHASE A
5 V/div 20 msec/div



U10 PIN 1
INDEX MOTOR PHASE A
5V/div 5msec/div



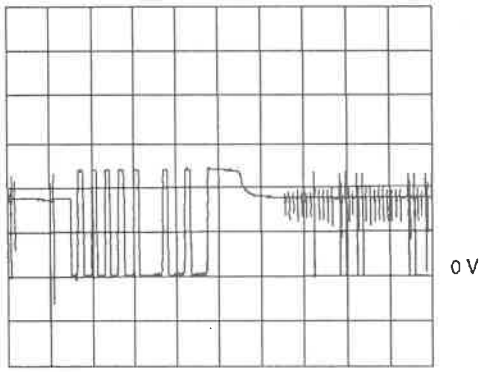
WIRING DIAGRAM
REVISION B ELECTRONICS



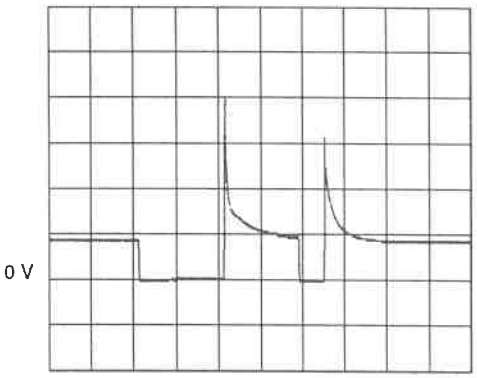
WAVE FORMS

REVISION B ELECTRONICS

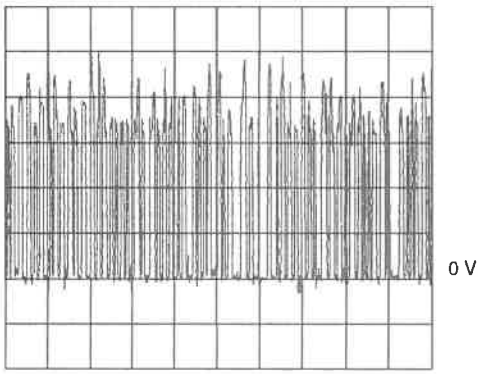
Q11 COLLECTOR
RIBBON SOLENOID PULSE
10 V/div 10 msec/div



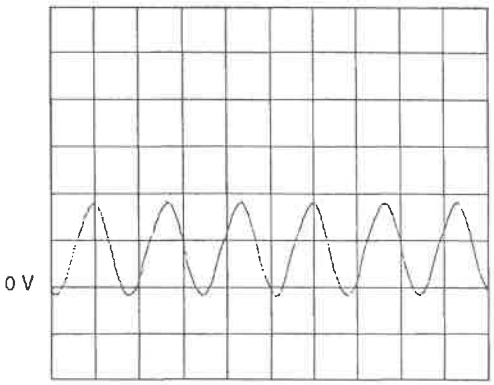
Q1 DRAIN
HAMMER SOLENOID PULSE
20 V/div 2msec/div



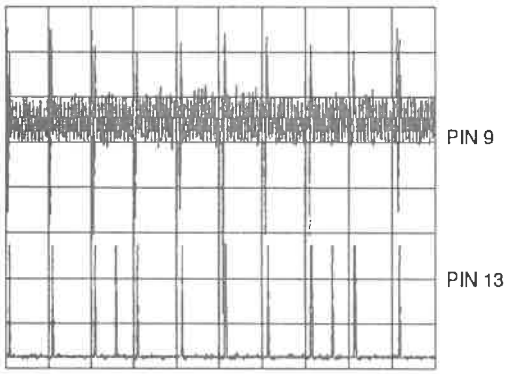
U17 PIN 13
DATA BIT 0
1V/div 50 µsec/div



U13 PIN 19
CRYSTAL OSCILLATOR
2V/div .05 µsec/div

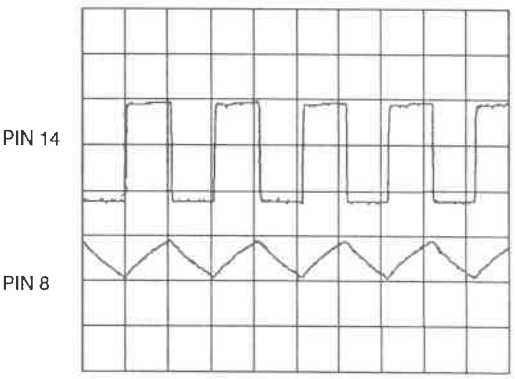


U5 PIN 9 & 13
KEYBOARD SCANNING*
ROW 6
2 V/div 5 msec/div



* When Key Switch is actuated.

U14 PIN 8 & 14
CLOCK GENERATOR
2V/div 10 µsec/div



SMITH CORONA

5D SERIES PERSONAL WORD PROCESSORS

SERVICE MANUAL

Printed in U.S.A. Form 3-0762 © Copyright 1988 by Smith Corona Corporation

PREFACE

This Manual provides service information for Smith Corona 5D Series Personal Word Processors.

The Manual is divided into sections that cover the different service areas required to service the machine. Thus, there is an Adjustment Section, Removals Section, etc. Refer to the Contents Page for a listing of subjects covered.

Except for the Specifications Section, there is an Index of all information provided in each Section at the beginning of the Section.

Throughout the Manual, directional terms such as front, rear, top, bottom, left, right, etc., always refer to the machine as used by a typist. Consequently, "right" always refers to the Platen Knob side of the typewriter, regardless of the machine position necessary for checking a requirement or making an adjustment.

Satisfactory performance requires that all parts be properly adjusted and lubricated, and their movements be free of binds. Worn or broken parts should be replaced.

IMPORTANT

Some service procedures require working with static sensitive devices, such as the Liquid Crystal Display and the Printed Circuit Boards. Whenever a procedure involves one of these devices, the procedure is marked:

OBSERVE STATIC PRECAUTIONS

Read the reverse side of the Contents Page (Page ii) carefully for a full understanding of procedures to follow when working with static sensitive devices.

5D SERIES PERSONAL WORD PROCESSORS SERVICE MANUAL

CONTENTS

SECTION	SUBJECT
1	SPECIFICATIONS
2	THEORY OF OPERATION
3	LUBRICATION & CLEANING
4	REMOVALS
5	ADJUSTMENTS
6	TROUBLESHOOTING
7	5DEA/5DEC DIAGRAMS

SERVICE TOOLS

In addition to common service tools (screwdriver, pliers, volt/ohm-meters, etc.) and static protection devices normally required for typewriter service, the following tools are needed for servicing 5D Series Personal Word Processors:

PART NUMBER	DESCRIPTION
250065	#0 PHILLIPS SCREWDRIVER
250072	MTA WIRE INSERTER (.100" CENTERS)
250073	FEELER GAGE SET .0015"-.025"
250101	MTA WIRE INSERTER (.156" CENTER)
250159	CARRIER CAPSTAN CABLE CLIP
250162	TORX T-10 SCREWDRIVER
250165	TORX T-8 SCREWDRIVER

STATIC ELECTRICITY

Static electricity in the service work area damages PC Boards. Smith Corona Typewriters and Word Processors are equipped with state of the art MOS IC's that are susceptible to damage by static electricity.

Damage can occur when handling or touching a PC Board or even when touching a connecting pin or wire that leads to the Board.

Static electricity is sometimes tough to identify. It takes about 10,000 volts of static electricity to feel a "zap" or see a spark. As little as 1000 volts can damage an IC. A person wearing synthetic soled shoes walking across a carpet in low humidity conditions can generate a charge of over 35,000 volts, enough to destroy all the MOS IC's on a PC Board.

The Liquid Crystal Display on a 5D Series Personal Word Processor also contains MOS IC's that are susceptible to static damage.

RECOMMENDATIONS

- Connect metal workbenches to ground with a one Meg Ohm resistor cord. Use conductive anti-static work mats, or particle board or wood as a work surface.
- Wear a wrist strap that is connected to ground through a one Meg Ohm Resistor when handling a PC Board AND when working on a machine with the top cover off.
- Do not have carpeting in the service area or on the workbench. Use an anti-static floor sealant on floor surfaces, particularly on vinyl surfaces.
- Do not allow synthetic fiber clothing (polyester, nylon, etc.) to contact machine components or the PC Board.
- Do not slide a PC Board over any surface.
- Keep the following static generators away from the work area:

  Styrofoam (including coffee cups) -- Candy wrappers -- Cellophane

NOTE: The pink bag in which Boards from Service Stores' are shipped does not induce a static charge, but it also does not prevent a static charge from going through to the PC Board. Take static precautions when handling a bagged Board.

The following anti-static equipment is available from National Service Stores:

PART #	DESCRIPTION
250166	VELCRO ADJUSTABLE WRIST STRAP
250167	10 FOOT ONE MEG OHM COILED CORD
250168	ALLIGATOR CLIP -- (Used for connecting coiled cord (250167) directly to an available ground)
250096	CIRCUIT TESTER WITH GROUND JACK -- (Used for connecting coiled cord (250167) to a power outlet's ground. Particularly useful when no other ground point is available. Circuit Tester also checks for correct wiring and polarity).

SECTION 1

SPECIFICATIONS

PWP40 (5DEA)
PWP 3 (5DCA)

POWER SUPPLY

POWER REQUIREMENTS:	117 VAC/60 Hz ± 10% 240 VAC/50 Hz ± 10%
FUSE PROTECTION:	.75 Amp, Slo-Blo
TRANSFORMER OUTPUT:	25.5 VAC to 42.4 VAC (No load) 17 VAC to 23 VAC
POWER SUPPLY PC BOARD OUTPUT:	+18 VDC, +6.5 VDC, +5 VDC, & -13 VDC
APPROXIMATE POWER CONSUMPTION:	20 WATTS (Idle) 70 WATTS (Printing)

PRINTING/PAPER HANDLING

PRINTING TECHNIQUE:	Fully formed character Daisy Print Element
CHARACTER SET:	96 printable characters on Print Element
CHARACTER SPACING (PITCH):	10 CPI: .100" (2.5mm) per space 12 CPI: .083" (2.2mm) per space
TYPING LINE LENGTH:	8.9" (226.1mm) 10 Pitch: 89 Characters per line 12 Pitch: 107 Characters per line
PRINT SPEED:	10 Characters per Second (maximum)
PRINT DIRECTION:	Typewriter Mode: Uni-directional (left to right) Word Processor Mode: Bi-directional
MARGINS:	Left Margin preset at space 12 (10 pitch) Right Margin preset at space 72 (10 pitch)
TABS:	One Preset at Space 17 (10 pitch); up to 8 programmable tab settings

PRINTING/PAPER HANDLING (continued)

RIBBON CASSETTES:

	CORRECTABLE CARBON	MULTI-STRIKE
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	55,000 Characters	205,000 Characters

CORRECTION TAPES:

	LIFT OFF (FOR CORRECTABLE)	COVER UP (FOR MULTI-STRIKE)
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	1400 Characters	1400 Characters

STEPPER MOTORS: 4 Phase, Bi-directional, Permanent Magnet Stepper Motors

	CARRIER	ELEMENT	INDEX
Step Angle:	7.5°	7.5°	7.5°
Steps Per Revolution:	48	48	48
Resistance Per Phase:	50 OHMS	24 OHMS	50 OHMS
Run Voltage:	+18 VDC	+18 VDC	+18 VDC
Hold Voltage:	+5 VDC	NONE	NONE

PAPER FEED: Friction, Single Sheets or Forms

LINESPACING: 1 (6 Lines per Inch)
1-1/2 (4 Lines per Inch)
2 (3 Lines per Inch)
1/2 through Code Key for Super and Subscript
Variable through Platen Knob

MAXIMUM PAPER WIDTH: 12" (304.8mm)

PAPER CAPACITY: 1 original plus 2 copies

KEYBOARDS

KEYBOARD: 44 Printable Character Keys
12 Function Keys
56 Molded Dome Conductive Switches with Leaf Return Springs
7 x 8 Electronic Keyboard Matrix

CURSOR KEYPAD: 5 Function Keys
5 Rubber Contact Keyswitches
1 x 5 Electronic Keyboard Matrix

ELECTRONICS

CONTROL PC BOARD:

Master Microprocessor:	Z80B--Master Controller for all machine functions
Slave Microprocessor:	Programmed 8053: --Scans Keyboard, Left End, and Mode Switches --Controls Stepper Motors & Solenoids
ASIC:	Applications Specific Integrated Circuit: --Disk Controller --RAM Controller --ROM Controller --Model Selector --Clock Generator
Dictionary ROM:	1 or 2 Megabytes (depending on language)
Other ROM:	One 512 K EPROM--Initialization Routines and lower 2/3 of Operating Software. One 256 K EPROM--All Disk, Typing, and Printing Routines, and upper 1/3 of Operating Software.
RAM:	Two 64 K x Four bit DRAMs: --55 Character Keyboard Buffer --One Line Correction Buffer (in Typewriter Mode Only) --42,000 Character Word Processor Memory (PWP 40) --32,000 Character Word Processing Memory (PWP 3)
Other:	LCD Controller Module
Power Supply:	Produces Four DC Outputs: +5 VDC -13 VDC +6.5 VDC +18 VDC

SYSTEM PHYSICAL DIMENSIONS

HEIGHT:	5.72" (145.3mm)	WIDTH:	16.85" (427.9mm)
DEPTH:	16.13" (409.7mm)	NET WT:	16.5 lbs (7.5 Kg) with Casing Lid and Power Cord

SYSTEM ENVIRONMENTAL CONDITIONS

OPERATING TEMPERATURES:	55° F to 100° F (13° C to 38° C)
OPERATING RELATIVE HUMIDITY:	30% to 80%
STORAGE TEMPERATURE:	14° F to 122° F (-10° C to 50° C)
STORAGE RELATIVE HUMIDITY:	20% to 90%

LIQUID CRYSTAL DISPLAY (LCD)

COLOR:	Transmissive Mode Super Twist LCD w/Blue/Violet Dots	
ACTUAL DISPLAY AREA:	Width:	80 Columns 480 Dots 9.258" (235.1mm)
	Height:	7 Lines 64 Dots 1.233" (31.3mm)

POWER REQUIREMENTS:

Logic Power Supply:	+5 VDC
Liquid Crystal Driver Supply:	-13 VDC
Liquid Crystal Driver Operating Voltage:	-13 VDC to 0 VDC
EL Panel (White):	120 VAC @ 600 Hz (inverted from +18 VDC)

DIMENSIONS (APPROXIMATE):	Width:	10.986" (279.1mm)
	Height:	3.0" (76.2mm)
	Depth:	.437" (11.1 mm)

DISK DRIVE

TYPE:	Single track spiral drive capable of storing and retrieving data from a double sided, single track storage disk
DISK ROTATING SPEED:	423 RPM $\pm$ 2.5%
DATA TRANSFER RATE:	101.5625 KBPS
MAGNETIC STORAGE AND RETRIEVAL:	Double sided, digital recording, storage, and retrieval medium, with 50 K storage in a maximum of ten files per side when prepared
MAGNETIC STORAGE MEDIUM:	3" Smith Corona DataDisk, double sided, double density

POWER REQUIREMENTS:	Logic Voltage:	+5 VDC
	Motor Voltage:	+6.5 VDC

DIMENSIONS (APPROXIMATE):	Length:	5.213" (132.41mm)
	Width:	3.905" (99.19mm)
	Height:	1.144" (29.06mm)

SECTION 2

THEORY OF OPERATION

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5.	LIQUID CRYSTAL DISPLAY (LCD)	2-6
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THEORY OF OPERATION

1) POWER SUPPLY

When the Personal Word Processor's AC plug is inserted into an AC outlet and the Power Switch is turned on, line voltage is applied to the primary winding of the transformer. Voltage is induced by two separate secondary windings of the transformer to produce two separate secondary voltages, 24 VAC and 18 VAC.

The 24 VAC is applied to the Bridge Rectifier CR10 on the Control PC Board, which provides approximately 24 VDC input to the following:

A) 18 Volt Regulator Circuit
B) 6.5 Volt Regulator Circuit

The major components of the 18 Volt Regulator Circuit are Q13, L1, and U14. Together these components produce a regulated +18 VDC ± 6.5%.

Components Q9, U15, L2, C29, and CR24 make up the 6.5 Volt Regulator Circuit, which provides a regulated +6.5 VDC ± 6.5% to various components and to Regulator U16.

Regulator U16 provides a regulated +5 VDC ± 5%.

The 18 VAC from the other transformer secondary winding is half wave rectified by components CR25 and C23. This half wave voltage is regulated by Zener Diode CR26 at -13 VDC ± 4%.

If the +5 VDC drops to zero volts, R36, R37, & R42 allow transistor Q5 to conduct which in turn shorts the -13 VDC to ground. This is a safety circuit to turn off the -13 VDC to the Liquid Crystal Display (LCD) if the +5 volt regulator fails.

The +5 VDC is used for Integrated Circuits, Shift Lock LED, Liquid Crystal Display (LCD), Carrier Holding Voltage, and Disk Drive.

The +6.5 VDC is used for driving the Disk Drive Motor.

The +18 VDC is used for driving the Carrier, Element, and Index Motors, the Hammer Solenoid, the Ribbon Solenoid, the DC/AC Inverter, and some discrete PC Board Components.

The -13 VDC is used for the Contrast Control potentiometer and the LCD.

The Control PC Board has a Watchdog Control circuit that monitors correct voltage to the following components:

A) Hammer Solenoid
B) Ribbon Solenoid
C) Carrier Phase CB
D) Carrier Hold CPS

If any of these components are left on, the Watchdog circuit places a high at Pin 9 (Reset) of the 8053 microprocessor. This forces the 8053 to reset and start the initialization process all over again. If the condition is not cleared, the Watchdog Circuit repeats its action, and reinitialization occurs again.

For safety, the AC Power Supply has a replaceable .75 Ampere Slo-Blo Fuse mounted in the Power Cord Receptacle. Also, there is a .25 Ampere Pico Fuse mounted on the Control PC Board to protect the 18 Volt Power Supply circuit. If the Inverter for the EL Panel draws excessive current, the Pico Fuse blows.

2) INITIALIZATION

The initialization sequence is described in full detail in the troubleshooting section of this manual. Briefly, the sequence is as follows:

A) When power is turned on, the Ribbon Solenoid quickly energizes to insure the Ribbon mechanism is in its proper starting position.

B) The Electronics moves the Carrier slightly to the right, to insure Carrier is not at the Left End Switch and then slightly to the left to insure the Carrier is not at the right end of the machine.

C) The Index Motor Shaft rotates 1/2 forward linespace and then 1/2 reverse linespace to establish a positive writing line.

D) Then, the Element Motor rotates quickly to snap the Element onto the Drive Disc, and then stops.

E) The Carrier moves left until the Element Home Positioner closes the Left End Switch; quickly moves right to open the Switch; left to close the Switch again; and continues approximately .100" further before stopping.

F) The Element rotates slowly counterclockwise until the Element Home Positioner drops into the Element Home Notch on the Rear Scissors Gear under Spring Tension, which opens the Left End Switch, and the Element stops rotating.

G) The Carrier moves right approximately .250" to establish position "0," and then continues to the preset left margin (Space 12). The default settings are 10 pitch, with Left Margin at 12, one Tab set at 17, and Right Margin at 72.

H) The LCD is turned "ON." First the Smith Corona Copyright Message is displayed, followed by the Typewriter Status or Word Processor Main Menu.

The Left End Switch is also used as a Lid Switch. Whenever the Deck is raised, the Lid Switch Actuator closes the Left End Switch through Spring tension, and the Carrier moves to the approximate center of the Platen. When the Deck is closed, the Switch opens, and the Carrier reinitializes and relocates to its previous position.

3) KEYBOARD

The Keyboard is composed of Keybuttons mounted in a plastic housing along with individual leaf-type springs, molded Dome Conductive Switches, a Flexible Circuit PC Board, and a metal plate. When a Keybutton is depressed, the Keybutton contacts the leaf-type spring, which in turn pushes down on a Molded Dome Conductive Switch. The Conductive Switch then comes into contact with the 7 x 8 matrix Flexible Circuit PC Board which now completes a circuit between a specific Column and Row. This completed circuit is then read by the Electronics of the Control PC Board, which determines what key was depressed.

The Keypad is composed of Keybuttons pressed onto rubber contact Keyswitch Plungers which are mounted in a housing above the Flexible PC Board. The Keypad Flexible PC Board is a 1 column x 5 row matrix. The matrix consist of an open electrical circuit which is closed by a conductive rubber Keyswitch Plunger. Refer to the appropriate Diagrams in the Diagrams Section for Layout and Matrix Charts.

3) KEYBOARD (continued)

A) KEY SCANNING -- The Electronics sequentially pulses Keyboard Columns C6 through C0, every 5ms. Also, the Electronics sequentially pulses the Keypad Column 7, Mode Selector Switch, and Left End Switch every 12.5ms. The Keyboard Rows R0 through R7 and Keypad Rows R0, R1, R4, R5, & R6 are sequentially read by the Electronics.

When a Keybutton is depressed, a circuit is closed in the Keyboard Matrix so that when a pulse appears in that Keybutton's "C" Column, the pulse also appears in the Keybutton's "R" Row. The Electronics determines which Keybutton was depressed by comparing which "C" Column was pulsed at the point in time that the "R" Row became active. If the same "C" Column and "R" Row activity is detected through two scanning cycles, the Electronics interprets this as a valid Keybutton depression and activates the circuits to perform the appropriate function.

When a Keybutton is held down, the Electronics delays 500ms after performing a function to verify that a repeat is desired, and then activates the circuits to continue performing that function until the Keybutton is released.

B) NON-MATRIX KEYBOARD FUNCTIONS -- The Shift Lock LED lights when the Shift Lock Key is depressed. When the LED is on, the electronics performs all printing functions in upper case. When either Shift Keybutton or the Shift Lock Keybutton is subsequently depressed, the Electronics turns the LED off, and printing resumes in lower case.

4) ELECTRONICS

The Control PC Board includes the DC Power Supply, Logic, Power Driver, and Memory (RAM & ROM) circuitry. The functions of the Control PC Board are described below:

The Control PC Board is the heart of the PWP. It provides DC Operating Voltages, controls input data, makes decisions, and controls output data and signals. The Transformer provides separate AC input voltages of 24 VAC and 18 VAC to the Control PC Board. The 24 VAC produces three DC Voltages: +5 volts, +6.5 volts, and +18 volts. The 18 VAC produces one negative DC voltage, which is -13 volts.

Input components to the Control PC Board include Left End/Lid Switch, Mode Selector Switch, Keyboard, Keypad, and Disk Drive.

The two main decision making IC's on the Control PC Board are the Motor Controller (8053) Microprocessor and the Memory Controller (Z80) Microprocessor.

The Motor Controller (8053) Microprocessor responds to commands from the Memory Controller (Z80) Microprocessor and determines which motors and solenoids must be energized to perform a function, and when and for how long they must be energized. The Motor Controller activates the circuits to perform the function, and signals the Memory Controller (Z80) that the function has been performed. The 8053 Monitors the Left End Switch during initialization and during machine operation to check if the switch was closed due to the Deck being raised. Also, the Motor Controller interprets the information it receives from scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch. After interpretation, the Motor Controller reacts and communicates with the Memory Controller (Z80). Finally, the Motor Controller (8053) provides a Reset (ZRESET) to the Memory Controller (Z80) during a power up initialization or a Watchdog time out.

4) ELECTRONICS (continued)

The Z80 Microprocessor sends and receives information to the LCD Controller, ASIC, Operating ROM, and Motor Controller (8053) Microprocessor. The Z80 and 8053 constantly communicate with each other in order to maintain proper timing and keep the operating functions in proper sequence so everything runs smoothly.

The Applications Specific Integrated Circuit (ASIC) is a state of the art (84 pin) integrated circuit. Basically, it is an Address Decoder, USART, and Frequency Divider which performs the following functions:

A) Disk Controller -- controls the data flow to and from the Disk Drive.

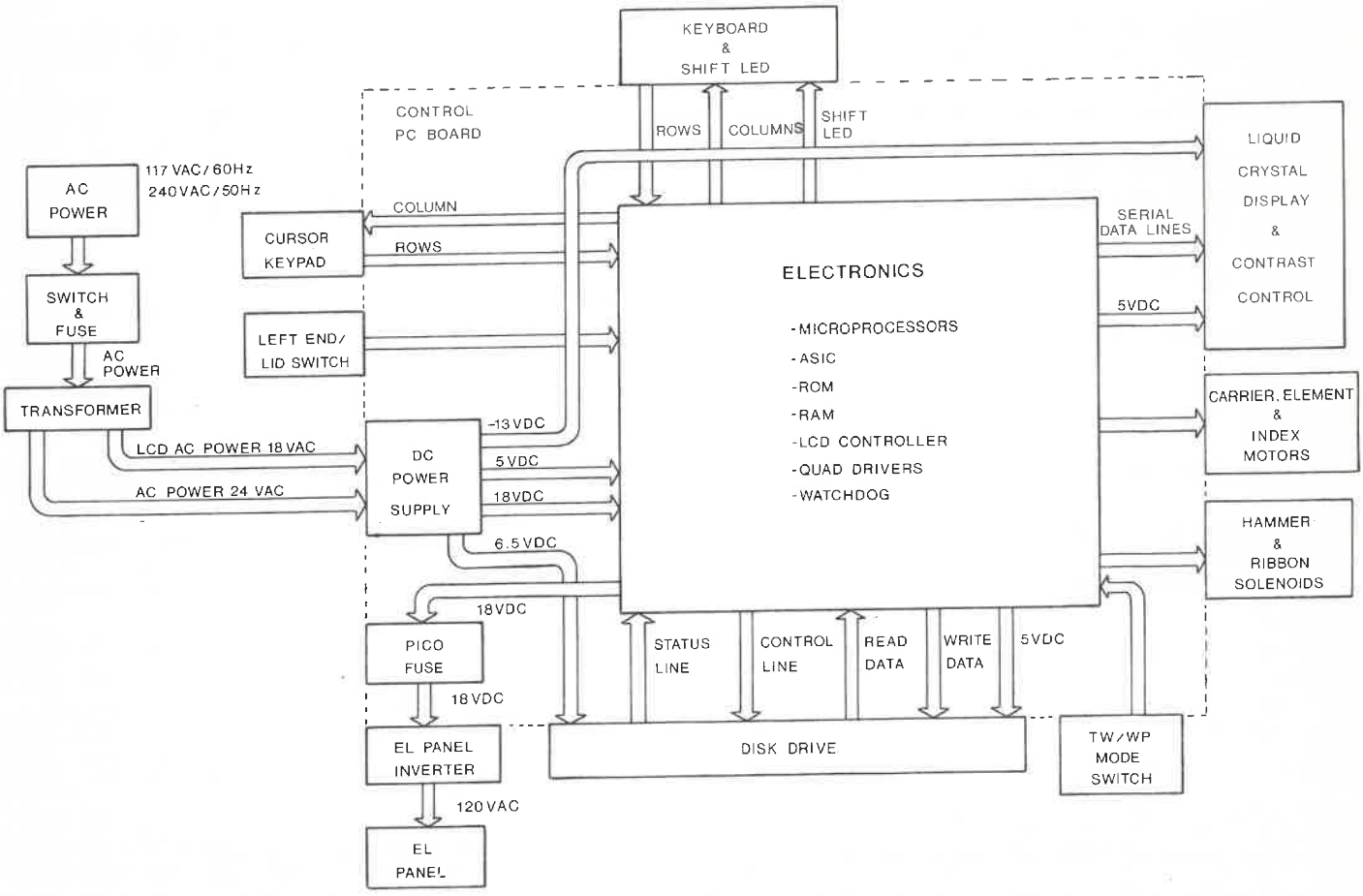
B) RAM Controller -- insures that the RAM is refreshed and has to choose whether to read the RAM or the ROM.

C) ROM Controller -- controls the Chip Enable for the different types of program ROM's used.

D) Model Selector -- tells the Z80 the Model (PWP 3 or PWP 40) that the Board hardware is set for.

E) Clock Generator -- produces different Frequency Clock signals from the Main Crystal (12 MHz) that are used by other IC's.

ELECTRONIC BLOCK DIAGRAM



5) LIQUID CRYSTAL DISPLAY

The Liquid Crystal Display (LCD) is an 80 columns (characters) wide by 7 lines high electronic dot display. Each character is 5 dots wide by 7 dots high. The color of the display is Silver Tone with dark blue/violet dots. The programming for the lines on the display is such that a blank dot appears between lines for clear readability. The LCD requires +5 VDC and -13 VDC to operate. Electronic data is sent from the Control PC Board to the LCD. Electronic drivers on the LCD turn on the required dots to form each individual character. The contrast of the characters formed in the Display is regulated by the Contrast control. This control is a sliding potentiometer that in effect varies the -13 VDC from -13 VDC to 0 VDC.

Behind the LCD is an Electro-Luminescent (EL) Back Light Panel. This panel provides back lighting for the LCD, which allows easy readability of the LCD in low light environments. The EL Panel operates on 120 VAC which is provided by a DC/AC Inverter. The input to the Inverter is +18 VDC and the output is 120 VAC @ 600 Hz.

6) DISK DRIVE

The Disk Drive is a single track spiral drive capable of storing and retrieving data from a 3 inch double sided, double density, single track storage disk. The Disk Drive requires +5 VDC for Logic Voltage and +6.5 VDC for Disk Drive Motor Voltage. The Disk Drive prepares (formats) the disk into 50 1K sectors (excluding the Directory). This allows 50K of text storage in a maximum of 10 files for each side of the disk for a total of 100K of text in up to 20 files per disk.

Normal rest position for the Head of the Disk Drive is near the end of the inside edge of the disk storage area. When a file is recalled or stored, the Disk Drive rotates and the head moves briefly toward the inside edge then quickly to the outside edge of the disk. It continues until it again reaches the rest position and Head and Disk Drive motor movement stops. This rest position allows the disk to be up to operating speed by the time the Head moves to the outside edge where the Directory information is stored. Once the Directory information is stored or read, then the head passes over an area where text is stored or read. Movement continues until rest position is reached once more.

The Control PC Board provides electronic data, power voltages, and communications to the Disk Drive through the ASIC chip When information is stored on the disk, the ASIC internally converts Parallel data to Serial data. The Serial information is then processed internally by the Disk Controller which converts this Serial information to a Modified Frequency Modulation (MFM) signal. This MFM signal is then sent to the Electronics of the Disk Drive for processing and text storage to the disk. The opposite sequence occurs when information is read from the disk and sent to the ASIC chip.

7) STEPPER MOTORS

There are three unipolar, four phase, Permanent Magnet Stepper Motors in the machine--the Index, Carrier, and Element Motors.

A) CONSTRUCTION

Each Stepper Motor is made of a radially magnetized Rotor with alternating North and South Poles, and two Stator Sections, A and B.

The Stator Sections each have Bifilar coils wound around a plastic bobbin in the inside diameter of the Stator. When the two Stator Sections are assembled, the teeth of one section are aligned one half tooth away from similar teeth in the other section.

Opposite ends of the Bifilar coils are connected internally and brought out of the stator through a common lead wire. The other end of each coil can be switched to ground through the Electronics. Only one coil of each Bifilar pair is switched to ground at any given time. There are two Bifilar pairs in the stator. The windings in one pair are referred to as A and A', and the windings in the other pair are called B and B'. The direction of current flow is the same in windings A and B, which is opposite to the direction of current flow in A' and B'. The current flowing through the coil creates lines of magnetic flux which charge the Stator Teeth as either North or South Poles. The Stator is constructed so that adjacent teeth are opposite poles when current is flowing through the coil. When current flows in the opposite direction, the polarity of the Stator Teeth changes to attract and repel the poles on the Rotor. Sequentially changing the direction of current flow rotates the Rotor through magnetic attraction and repulsion.

B) DRIVE STRATEGY

The three Stepper Motors make use of different Run, Settle, and Hold voltage levels during operation which are regulated by the Electronics. A run level voltage is applied to the active halves of the coils to produce a strong magnetic field during operation. A settle level voltage is used as a transition voltage when one half of a coil is switched off and the other half switched on. The Carrier Motor also makes use of a third voltage level (Holding Voltage), when stationary, to keep the Carrier stable for printing. The Holding Voltage is drawn off the +18 VDC, and stays between +4 to +5 VDC.

OPERATING VOLTAGES

MOTOR	RUN VOLTAGE	SETTLE VOLTAGE	HOLDING VOLTAGE
Carrier	+18 VDC	+18 VDC	+5 VDC
Element	+18 VDC	+18 VDC	None
Index	+18 VDC	+18 VDC	None

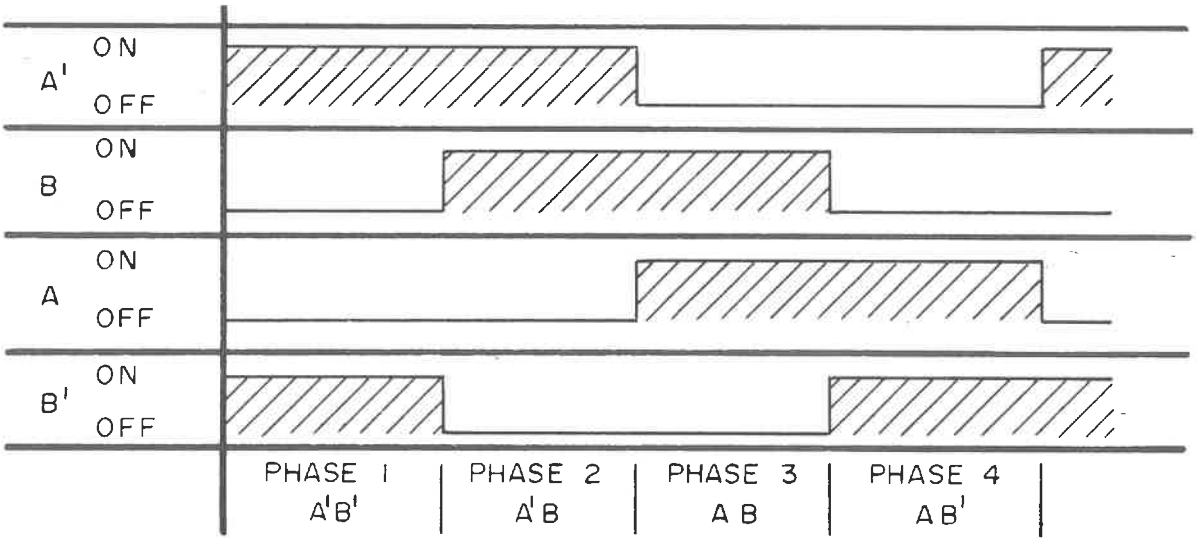
As the Motor Phases change the lines of magnetic flux, the Permanent Magnet Rotor rotates through magnetic attraction and repulsion. The Electronics reverses the phase sequence for reverse Rotor rotation. NOTE: The terms "Phase 1," "Phase 2," etc., are used for description purposes only. The actual starting phase for any motor move is dependent upon where the motor stopped in its previous move, and on the programming in the Electronics. All subsequent motor steps follow the normal sequence. The starting phase for the Carrier Motor is dependent upon the pitch selected and the Left End Switch Adjustments.

7) STEPPER MOTORS (continued)

C) STEP ANGLES

The Stator Teeth and magnetic Rotor Poles of each motor are arranged so that each successive Phase that is energized rotates the Rotor the same number of degrees. The step angle for all Motors is 7.5 , which means there are 48 full steps per revolution. The number of phases that are energized to perform any particular function is dependent on the nature of the, function.

STEPPER MOTOR TIMING CHART



8) CARRIER DRIVE

The Carrier Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Carrier Motor rotates clockwise and counterclockwise to move the Carrier left and right along the Carrier Rails for printing, correction, and spacing functions.

There is a 16 tooth Drive Gear permanently attached to the Carrier Motor Rotor Shaft. This Gear is in mesh with a 40 tooth, two piece Scissors Gear. The two halves of the Scissors Gear are held in mesh with the Drive Gear under tension of a Spring assembled between the two halves. This Spring tension eliminates all Gear backlash, which provides improved Gear wear.

8) CARRIER DRIVE (continued)

The forward half of the Carrier Scissors Gear is part of the Carrier Drive Capstan. The Carrier Drive Cable is wound around the Capstan, and anchored in the left and right Carrier Module Frames. When the Carrier Motor rotates clockwise or counterclockwise, the Capstan rotates to move the Carrier left or right along the Carrier Drive Cable.

9) ELEMENT DRIVE

The Element Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Element Motor rotates clockwise and counterclockwise to place the desired character on the Print Element in line with the Hammer for printing and correction.

There is a 48 tooth Drive Gear permanently attached to the Element Rotor Shaft. This Drive Gear is in mesh with a 96 tooth, two piece Element Scissors Gear. The front half of the Element Scissors Gear is pressed onto the Element Drive Shaft, so that when the Element Motor rotates clockwise and counterclockwise the Element Drive Disc rotates also.

The Element Home Positioner and Positioner Actuator are mounted on the rear of the Element Motor Mounting Plate. During initialization, the Positioner Actuator contacts a Stud on the Left Frame, and pivots the Home Positioner so that the Positioner Tooth contacts the ridge on the Rear Scissors Gear. When the Element Motor rotates counterclockwise, the Positioner Tooth drops into the Notch in the Gear Ridge to stop the Element at Home Position.

The Element Drive Disc has two rectangular holes and one round hole which are keyed to fit the Print Element. When a Print Element is inserted, and the Hammer Assembly is pivoted rearward against the Element, the Element Pusher (mounted in the Hammer Solenoid Bracket) pushes the Element against the Drive Disc. During initialization, the Element rotates quickly clockwise to snap the Element onto the keyed holes in the Element Drive Disc under tension of the Element Pusher. The keyed holes assure that the Home Character (e) is at Print Position when the Positioner Tooth is engaged in the Notch on the Rear Scissors Gear.

Element Home Position is established during initialization. If a new Print Element is inserted after initialization, opening and closing the Lid reinitializes the machine to reestablish Home position.

The Electronics is programmed to select the shortest distance to the next printable character on the Element whether printing from the Buffer or starting at Home Position.

10) PRINT HAMMER

The Print Hammer is pivotally attached to the Hammer Assembly Bracket, and rests on the Hammer Solenoid Plunger under spring tension. When the Electronics energizes the Hammer Solenoid for printing, the Solenoid Plunger moves upward to pivot the Hammer top rearward to strike the Print Element Petal in its path against the Platen. When the Hammer Solenoid is de-energized, the Hammer returns to rest under spring tension.

The Electronics is programmed to energize the Hammer Solenoid for longer or shorter periods of time to provide stronger or weaker impression for individual characters. For broad faced characters (W, M, etc.), the Electronics energizes the Solenoid for a longer period of time than for small faced characters (., _, etc.). There are various time periods programmed in the Electronics to provide equal impression among all characters in all pitches.

11) CASSETTE RIBBON FEED/CORRECTION RIBBON LIFT & FEED

The Cassette Ribbon Feed and Correction Ribbon Lift & Feed are both driven by the same mechanism. This mechanism has one solenoid which is energized every Cassette Ribbon or Correction Ribbon cycle. A latching system, controlled by the energizing of the Print Hammer Solenoid, triggers either a Cassette Ribbon Feed or a Correction Lift and Feed. The normal position of this latch mechanism is Correction Lift and Feed.

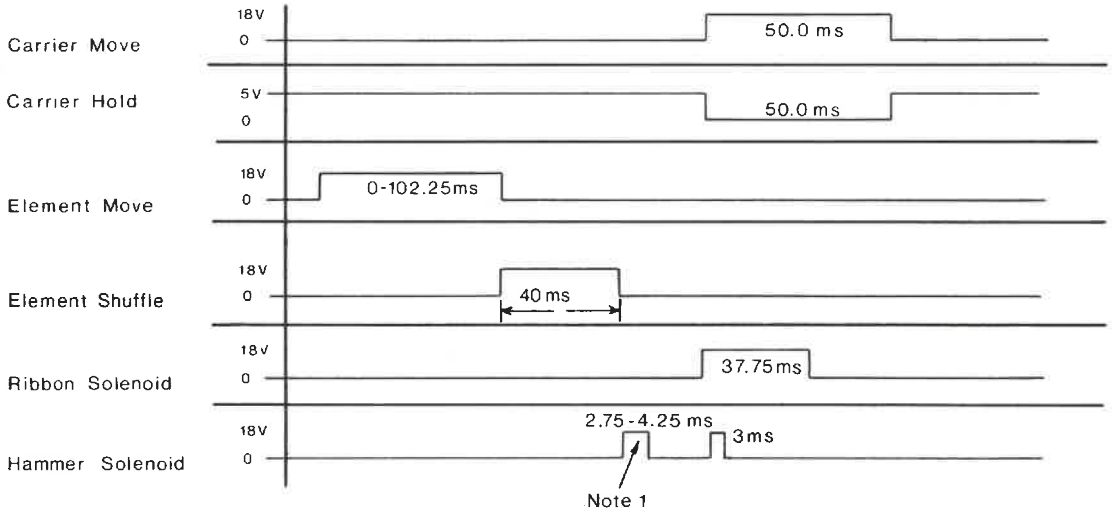
The Electronics determines from Keybutton depressed whether the feed should be Cassette Ribbon or Correction Ribbon. A brief sequence for each action follows:

A) CASSETTE RIBBON - the Element rotates to the selected character; the Hammer fires to print the character and trip the Ribbon mechanism for a Cassette Ribbon Feed; the Ribbon Solenoid energizes to feed the Cassette Ribbon; the Carrier moves right one space (see Print Cycle Chart below).

NOTES: 1) When the Ribbon Solenoid is de-energized, the Ribbon mechanism returns to the Correction Lift and Feed position.
2) The Ribbon advance during a Cassette Ribbon cycle is for the next printable character.

B) CORRECTION LIFT & FEED - the Carrier moves left to the character location; the Element rotates to the selected character; the Ribbon Solenoid energizes to lift and feed the Correction Ribbon, and the Hammer fires to transfer the character to the Correction Ribbon. The Ribbon Solenoid de-energizes, allowing the Correction Bail to drop to its normal position and the Ribbon mechanism to the Correction Lift and Feed position.

PRINT CYCLE - SINGLE CHARACTER (10 PITCH)



NOTE 1:
LENGTH OF PULSE VARIES
WITH THE PITCH SELECTED
AND HAMMER ENERGY LEVEL.

12) CASSETTE RIBBON FEED MECHANISM

When latched for Cassette Ribbon feed, the Cassette Ribbon Feed mechanism feeds Ribbon when the Ribbon Solenoid is energized. The top of the Ribbon Driver seats in the Drive Gear in the Ribbon Cassette. The bottom of the Ribbon Driver seats into the Ribbon Ratchet Hub which in turn fits over the Ribbon Feed Shaft. On the bottom of Ribbon Feed Shaft is an Anti Backup Feed Spring which allows the Feed Shaft to rotate only in one direction.

After printing the previous character, the Ribbon Solenoid energizes and pulls the pawl of the Ribbon Feed Assembly in the teeth of the Ribbon Drive Ratchet Hub. This action rotates the Ribbon Feed Shaft, which rotates the Ribbon Driver approximately 30° for each printable character. The Cassette Ribbon is now positioned for the next printable character.

13) CORRECTION LIFT & FEED MECHANISM

When the Ribbon mechanism is in its normal position, it is ready for a Correction Lift and Feed cycle. As the Ribbon Solenoid plunger is pulled into the Solenoid, the bottom of the Correction Bellcrank is pulled forward, moving the top tail upward, which causes the Correction Bail to lift upward. As the Bail raises, the Correction Feed Pawl ratchets over one tooth of the Correction Take-up Spool. When the Ribbon Solenoid Plunger is released, spring tension on the Bail returns all parts to rest. As the Bail lowers, the Feed Pawl engages a tooth in the Correction Take-up Spool to rotate the Take-up Spool one tooth past the Stop-Pawl to feed the Correction Ribbon.

14) PAPER FEED

Driven by the Electronics, the Index Motor rotates clockwise and counter-clockwise to drive the Platen for Paper Feed.

On the Index Motor is a 12 tooth Drive Gear that is permanently attached to the Index Motor Rotor Shaft. This Gear is in mesh with a Pinion Face Gear. The Pinion Face Gear has a smaller gear that meshes with a large gear of the Linespace Pinion Assembly. The Linespace Pinion Assembly has a small gear that is in mesh with the Gear surface of the Platen Knob Assembly. The Platen Knob is mechanically attached to the Platen. This series of gears provide the correct gear speed and torque to provide proper rotation of the platen.

When the Carrier Return Keybutton or Code function is depressed, the Electronics energizes the Index Motor to rotate the Platen the number of linespaces as determined by the operator's linespace selection (1, 1 1/2, or 2).

The Paper Release Lever holds the Paper Table so that Front and Rear Feed Rollers are against the bottom of the Platen to provide Paper Feed through friction when the Platen rotates. When the Paper Release Lever is pulled upward, the Paper Table drops slightly to remove the Feed Roller tension, which allows the operator to straighten a sheet of paper before printing.

SECTION 3

LUBRICATION & CLEANING

LUBRICATION & CLEANING INDEX

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CLEANING PROCEDURES	3-2
LUBRICATION POINTS	3-3

GENERAL LUBRICATION PROCEDURE

The main illustration points for 5D Series Personal Word Processors are illustrated and listed beginning on page 3-3. Each lubrication point is indicated with an arrow and a circled reference number indicates the lubricant used at that point. The following lubricants are required:

REFERENCE NUMBER	DESCRIPTION	PART NUMBER
1	Dow #200 Silicone	250254
2	VW-1222 Non-Fluid Oil	250299
3	Mobil FM2 Grease	250500
4	Anderol 465	250289
5	Dow #111 Silicone	250290
6	Never-Seez Grease	250293
7	NYOGEL	250262

IMPORTANT: The following parts should be kept free of dirt, grease, and oil:

Control PC Board
Transformer
Disk Drive
LCD

CLEANING PROCEDURES

Cleaning procedures for machine parts and recommended cleaning solutions are outlined below.

DO NOT, under any circumstances, use an air hose or chemical cleaner to clean an Electronic Typewriter. Debris and chemical residue can impair the function of electrical components. If an internal part requires cleaning, wipe that part clean with clean, dry cloth.

CAUTION: WHEN CLEANING WITH RECOMMENDED CLEANING SOLUTIONS, TAKE CARE THAT NO LIQUID DRIPS OR SPLASHES ONTO INTERNAL PARTS. KEEP ALL SOLVENTS AND PETROLEUM DISTILLATES AWAY FROM ELECTRICAL COMPONENTS.

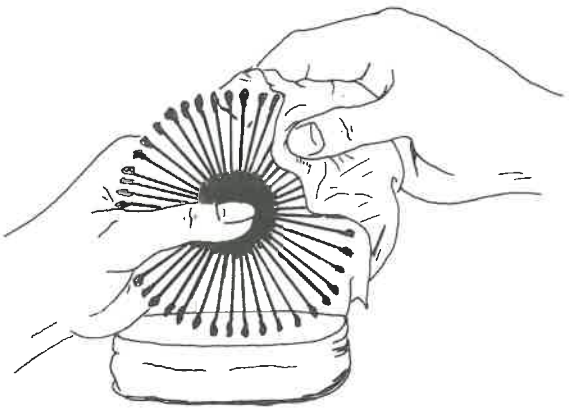
PLATEN

Remove Platen (see Removals). Soak a clean cloth with rubbing alcohol, and wipe the Platen surface to remove dust, dirt, and ink.

NOTE: If Platen is not removed, do not use alcohol: use a household cleaner such as Windex.

PRINT ELEMENT

Dip the Print Element Petals into a container of rubbing alcohol, and wipe dry with a clean cloth. DO NOT soak the Print Element in the alcohol.

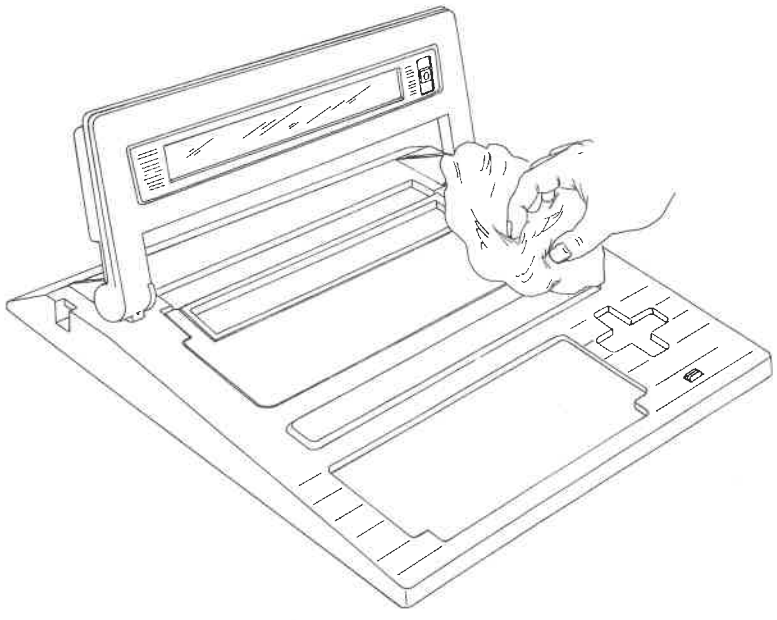


JACKETS

Remove Jackets and wipe clean with a sponge soaked in a mild ammonia or soap solution. DO NOT use any cleaning solutions which contain chlorinated compounds.

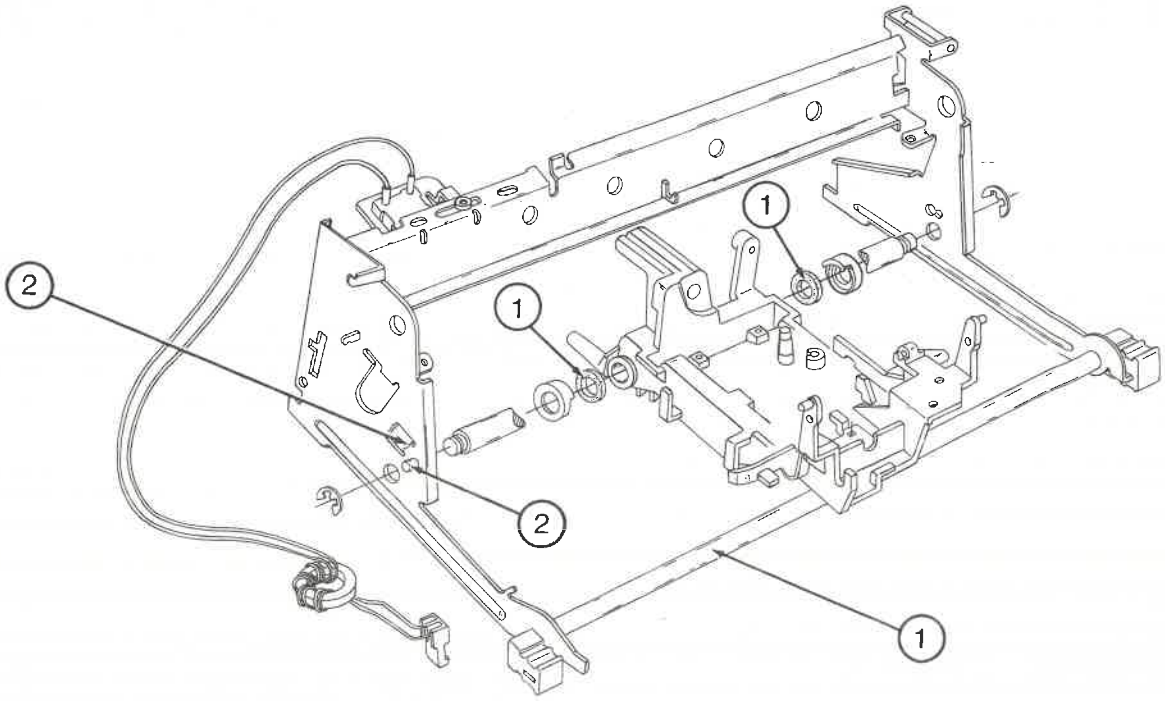
LCD

Use a soft camel hair artist's brush to remove dust. Use a soft dry cloth to remove smudges. DO NOT allow any liquid to come in contact with the LCD.

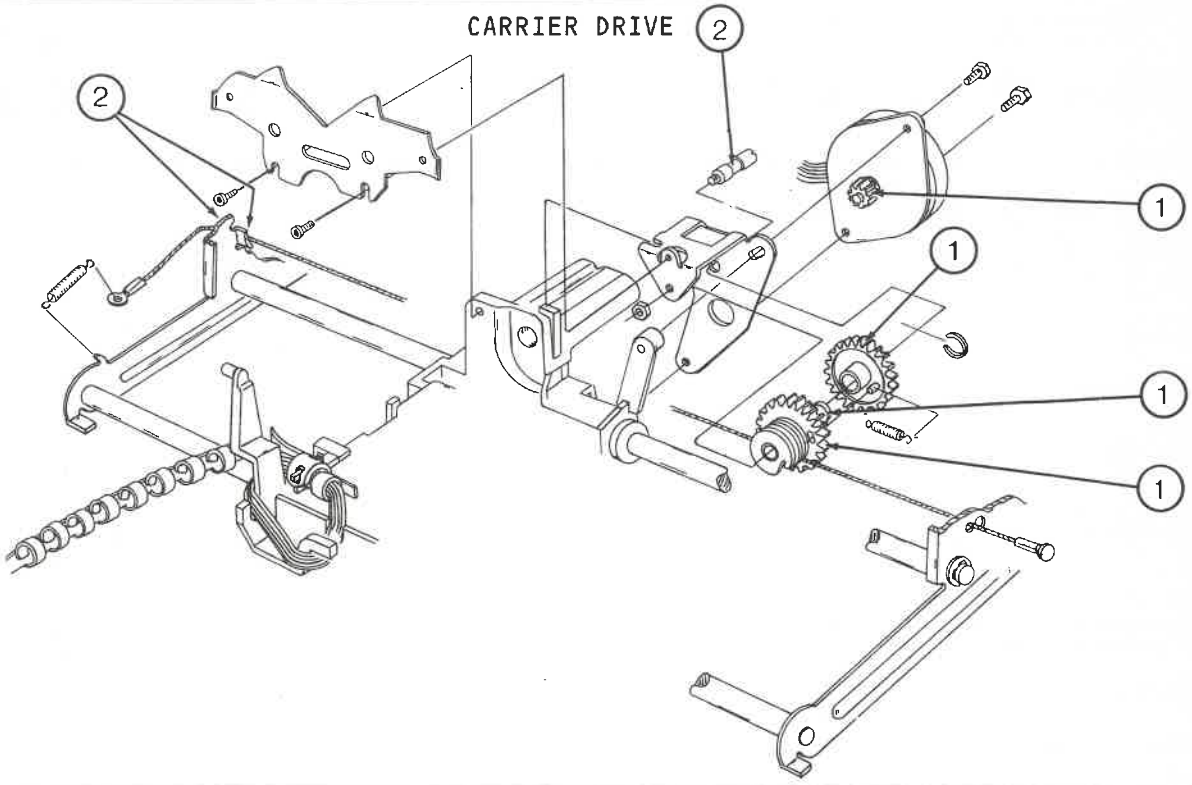


LUBRICATION POINTS

CARRIER RAILS



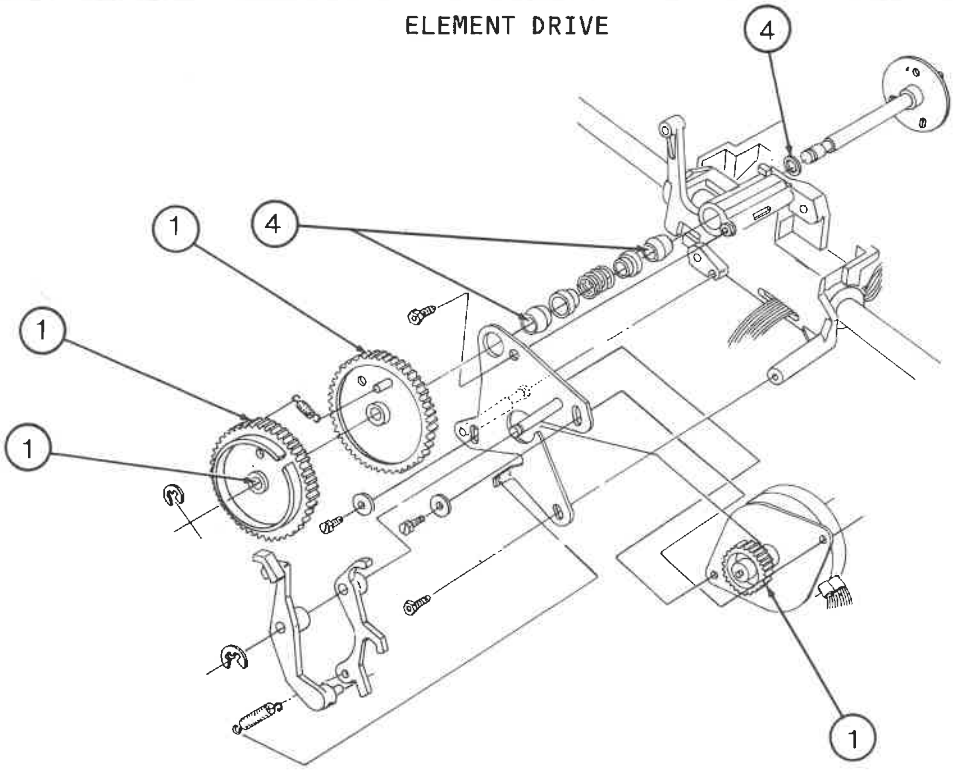
CARRIER DRIVE



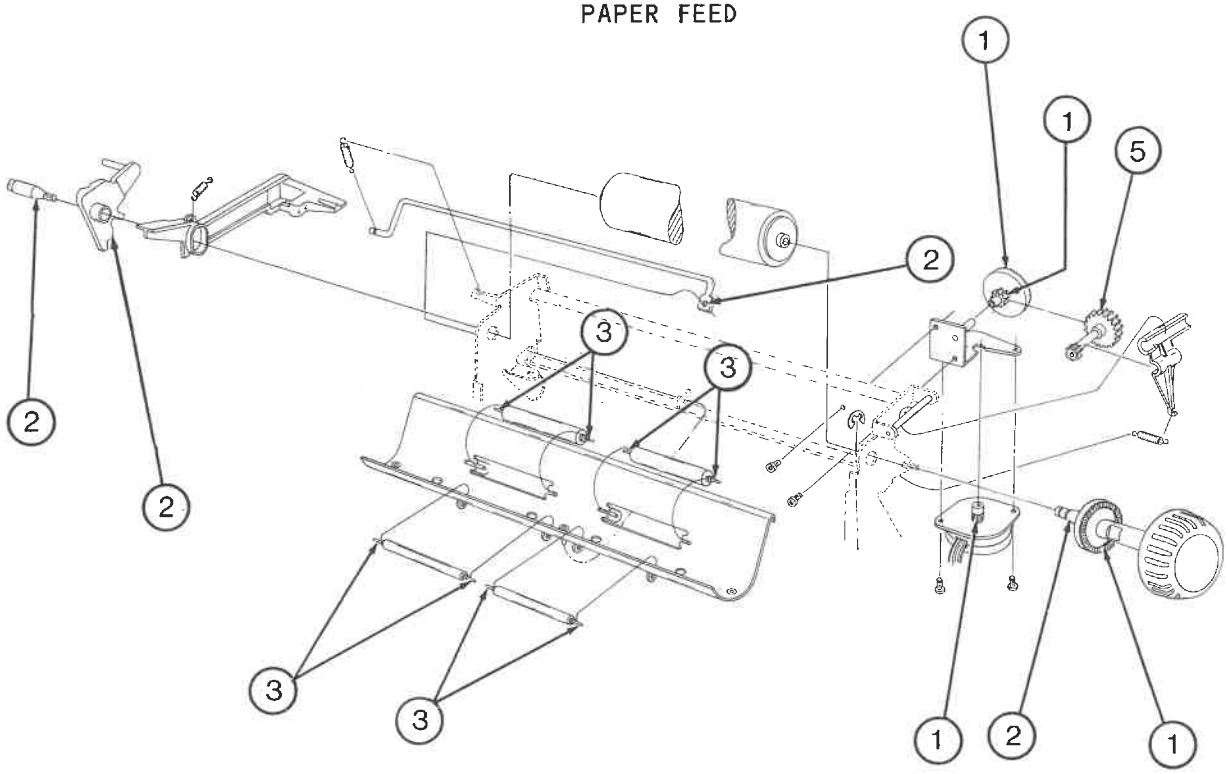
REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

LUBRICATION POINTS

ELEMENT DRIVE



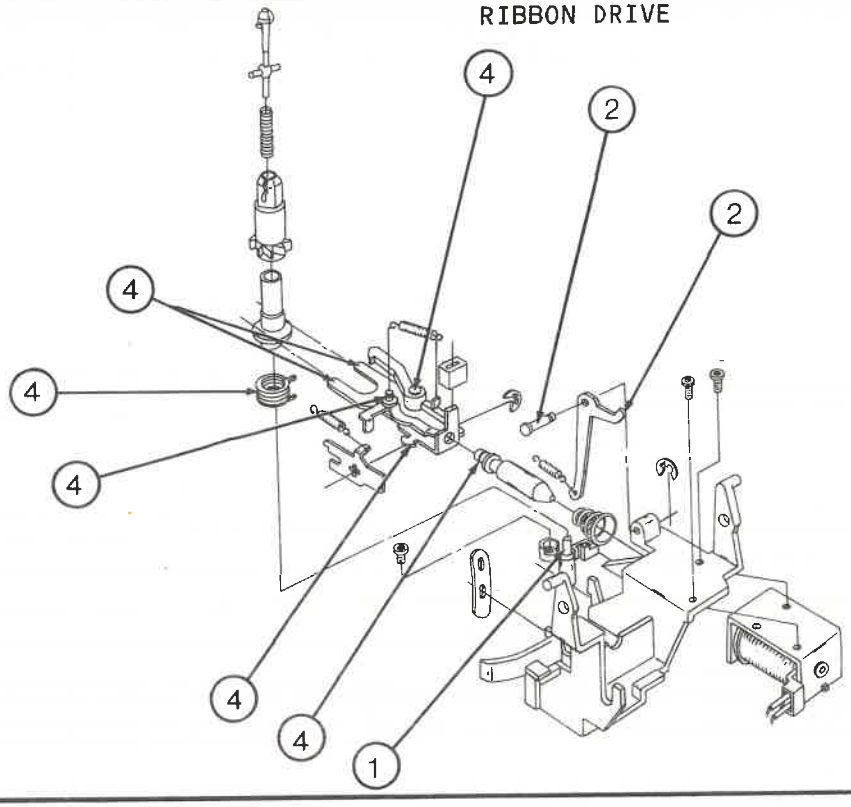
PAPER FEED



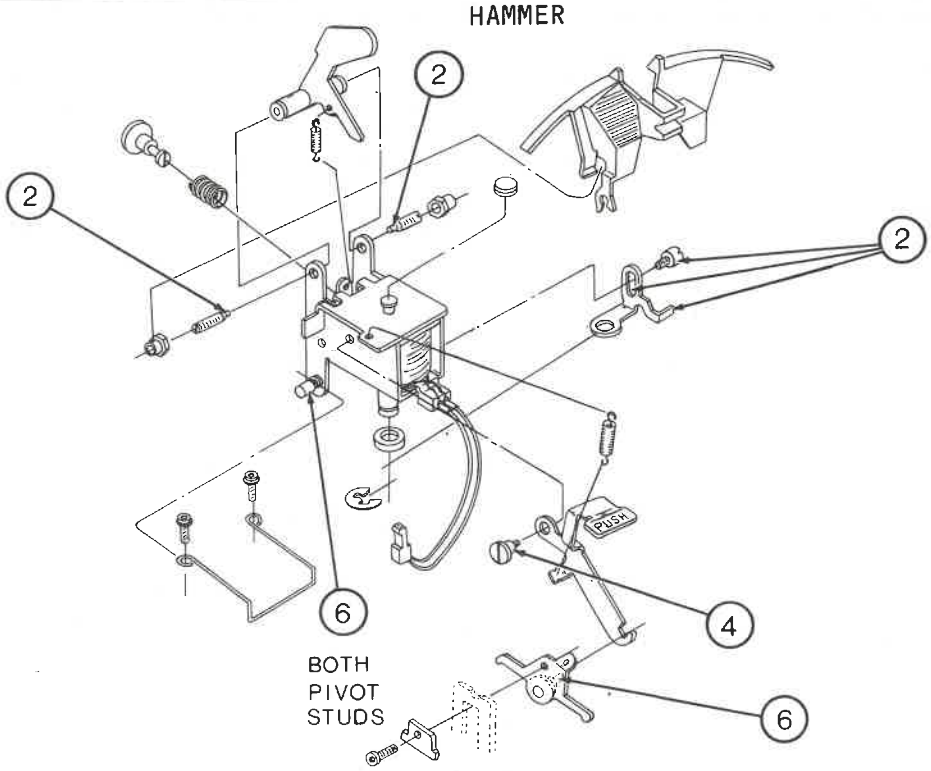
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

RIBBON DRIVE



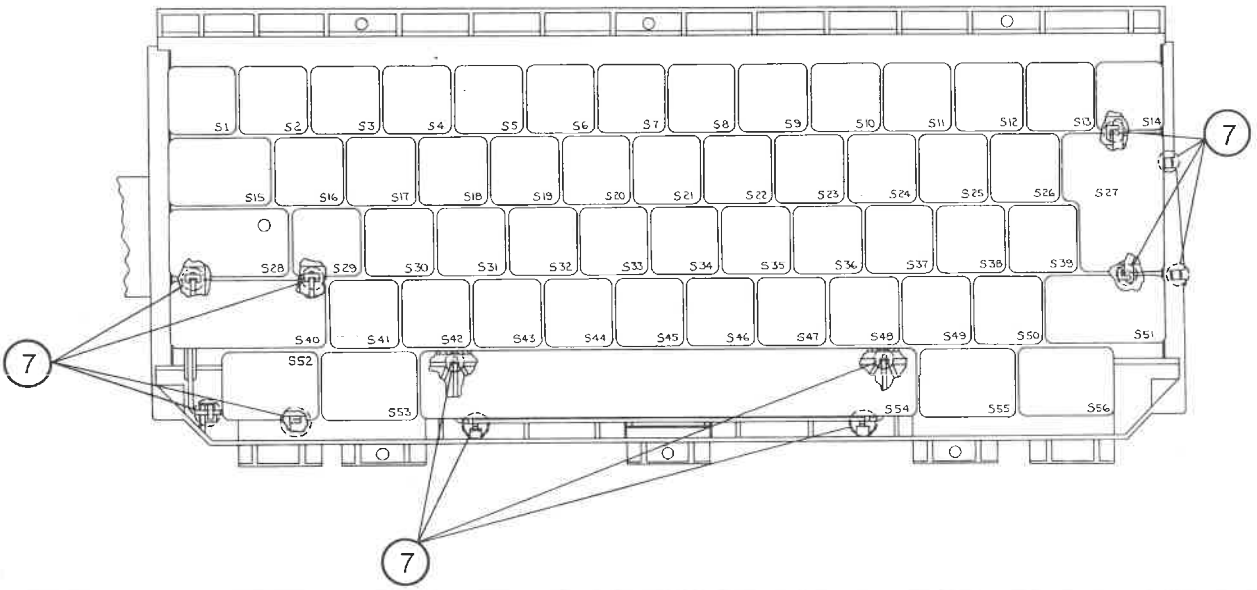
HAMMER



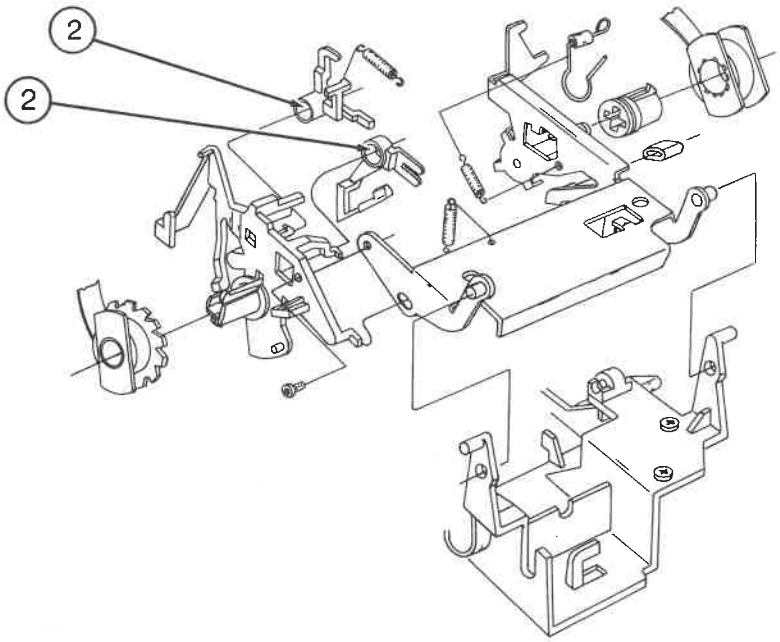
REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

LUBRICATION POINTS

KEYBOARD



CORRECTION LIFT/FEED



REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

SECTION 4

REMOVALS

GENERAL PROCEDURE: All removals should be performed with power cord unplugged and machine at rest.

Prior removal of particular groups of parts is indicated in each removal procedure as required.

Adjustments broken during a removal are indicated at the bottom of each procedure, and are referenced to adjustment numbers in the Adjustment Section. Refer to the Branch Display on page 5-1 for sequential relationships among adjustments.

OBSERVE STATIC PRECAUTIONS

Removals of PC Boards and other static sensitive parts are marked as above. Be extremely careful when handling these parts as static electricity can cause irreparable damage to static sensitive devices. Refer to the reverse side of the Contents page (page ii) for proper procedures to follow when handling static sensitive devices.

REMOVALS INDEX

1. Mask/LCD Removal ---------- 4-2
2. Keyboard, and Cursor Keypad Removal ---------- 4-3
3. Cursor Keypad Keyswitch Plunger Removal ---------- 4-3
4. Keyboard Component Removals ---------- 4-4 & 4-5
5. LCD and LCD Housing Removal ---------- 4-6 & 4-7
6. LCD Housing Brake Assembly Removal ---------- 4-6 & 4-7
7. Control PC Board Removal ---------- 4-8
8. Disk Drive Removal ---------- 4-8
9. Frame Assembly Removal (with Carrier & Paper Handling) --------- 4-9
10. Power Supply Removal ---------- 4-10
11. Correction Bail Removal ---------- 4-11
12. Correction/Cassette Ribbon Solenoid Removal ---------- 4-11
13. Ribbon Mechanism Removal ---------- 4-12
14. Hammer Solenoid Assembly Removal ---------- 4-13
15. Element Motor Removal ---------- 4-13
16. Element Drive Shaft and Bearings Removal ---------- 4-14
17. Platen and Paper Table Removal ---------- 4-15
18. Index Motor Removal ---------- 4-15
19. Carrier Motor and Carrier Capstan/Cable Assembly Removal ------- 4-16 & 4-17
20. Carrier Molding Removal ---------- 4-18

1. MASK/LCD ASSEMBLY REMOVAL

1) Remove four SCREWS (3).

2) Lift right side of MASK (1) slightly and disconnect Mode SWITCH CONNECTOR (2) from Control PC Board.

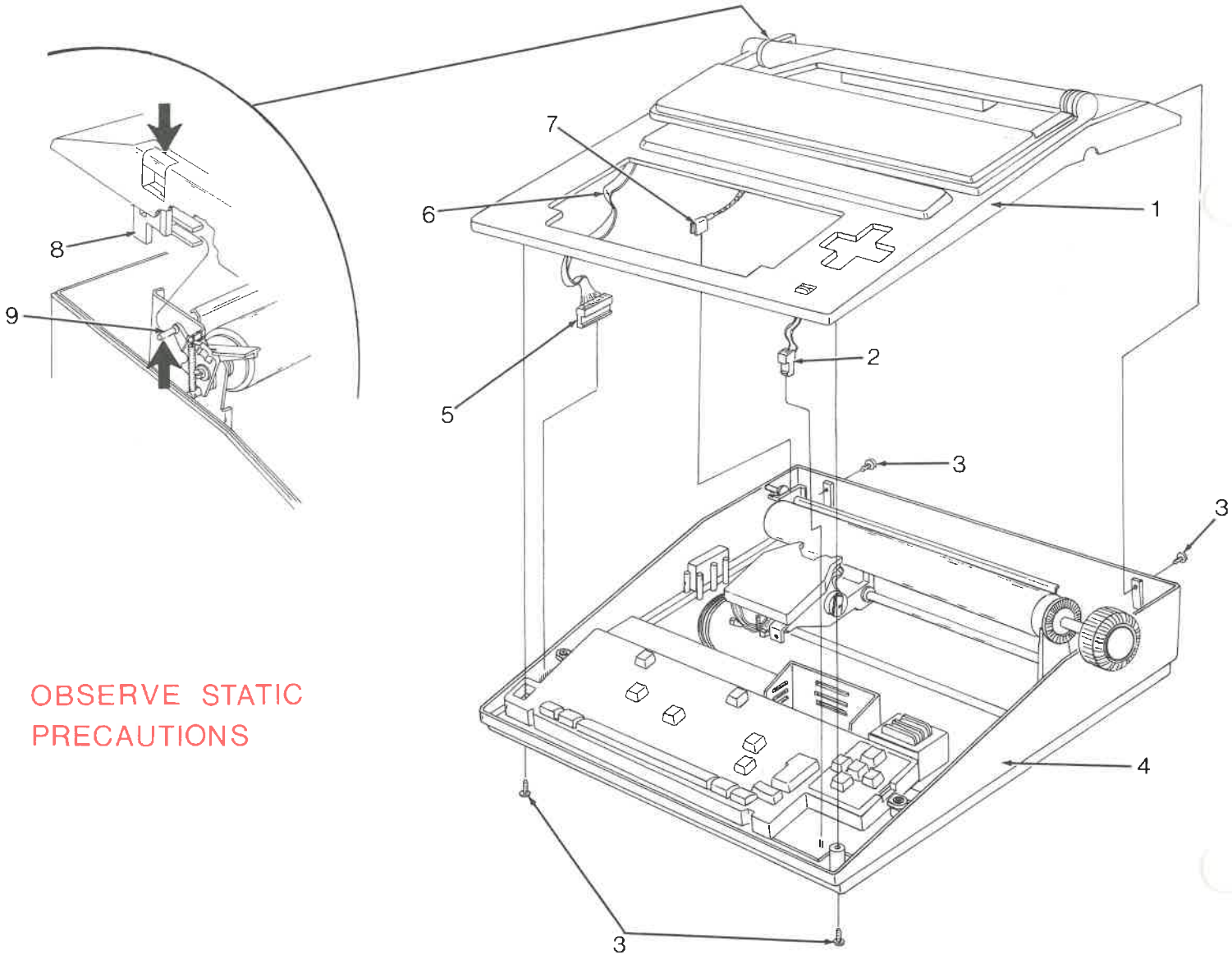
3) Raise left front of Mask and remove LCD CONNECTOR (5) from Control PC Board.

4) Move MASK (1) upward and rearward to disengage PAPER RELEASE LEVER (9) from PAPER RELEASE ACTUATOR (8). (See insert).

5) Pivot right side of Mask Assembly off to the left. Disconnect the LCD GROUND WIRE (7) from Frame Assembly. Lift LCD CABLE (6) from Casing Base and lift off Mask. NOTE 1: Deck and Paper Bail can be unsnapped from Mask. NOTE 2: To remove CASING BASE (4), remove Keyboard Frame Assembly, Frame, Control PC Board, Disk Drive, and Power Supply (see Removals Index).

REPLACEMENT:

Reverse procedure. NOTE: Before replacing MASK (1), push PAPER RELEASE ACTUATOR (8) down and lift PAPER RELEASE LEVER (9) up to assure easy alignment of the Lever Stud into the Actuator Fork.

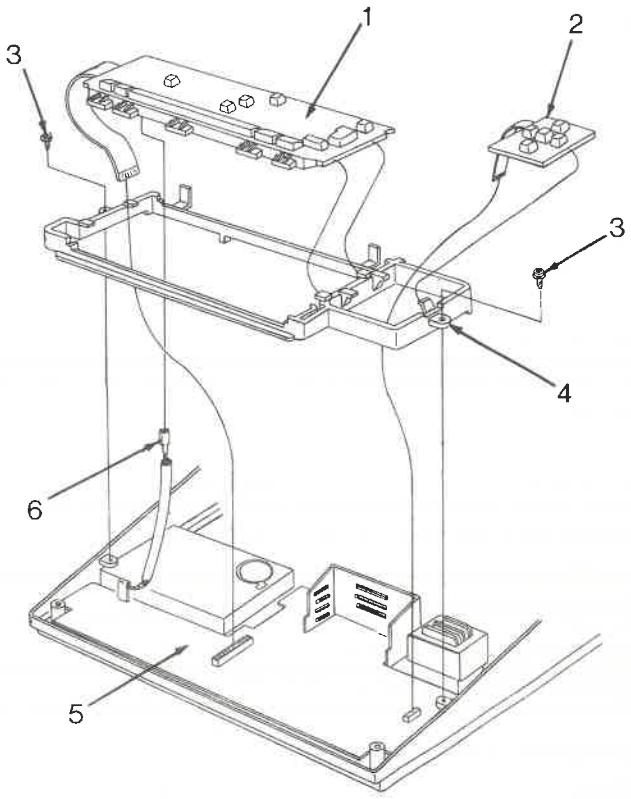


OBSERVE STATIC PRECAUTIONS

2. KEYBOARD AND CURSOR KEYPAD REMOVAL

1) Remove Mask/LCD Assembly (see Mask/LCD Assembly Removal).
2) Remove two SCREWS (3).
3) Disconnect Keyboard Flexible Cable and Cursor Flexible Cable Connectors from CONTROL PC BOARD (5). Disconnect GROUND CABLE (6) from KEYBOARD (1). Lift out KEYBOARD FRAME ASSEMBLY (4).
4) To remove CURSOR KEYPAD (2), disconnect Cursor Keypad Connector from Control PC Board, spread Keyboard Frame and lift out Keypad.
5) To remove KEYBOARD (1), disconnect Keyboard Connector, spread right side of Keyboard Frame, and lift out Keyboard.

REPLACEMENT: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.



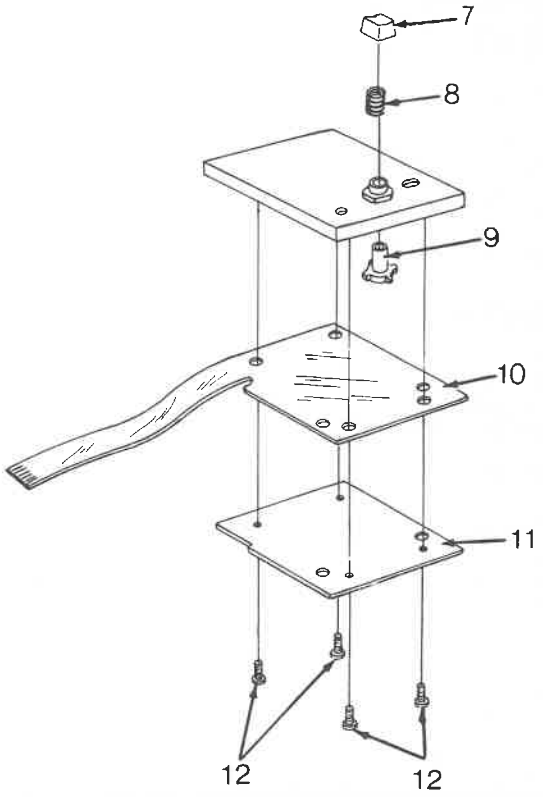
3. CURSOR KEYPAD KEYSWITCH PLUNGER REMOVAL

OBSERVE STATIC PRECAUTIONS

1) Remove Mask/LCD Assembly and Keypad.
2) With Keypad upside down, (Keybuttons facing down), remove SCREWS (12) and lift off Keypad METAL PLATE (11).
3) Lift off Keypad FLEXIBLE PC BOARD (10).
4) To remove KEYSWITCH PLUNGER (9), pry off KEYBUTTON (7) and lift SPRING (8) from the top of Keypad, and KEYSWITCH PLUNGER (9) from the bottom of Keypad.

NOTE: To remove a Cursor Keypad Keybutton, gently pry up on the Keybutton.

REPLACEMENT: Reverse procedure.



4. KEYBOARD COMPONENT REMOVALS

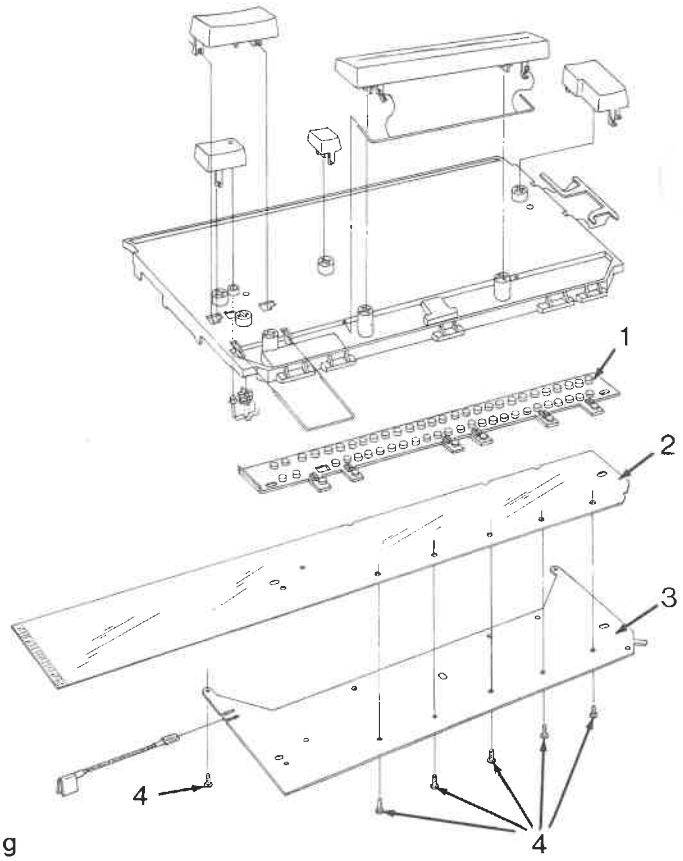
1) Remove Mask/LCD Assembly and Keyboard (see Removals Index).

2) With Keyboard upside down (Keybuttons facing down), remove SCREWS (4) and lift off Keyboard METAL PLATE (3).

3) Lift off Keyboard FLEXIBLE CIRCUIT (2) and MOLDED SWITCHES (1) from Keyboard.

4) Keybutton Removals:

The Keybuttons on the Keyboard cannot be removed by prying up the Keybutton Refer to the following procedure.



IMPORTANT

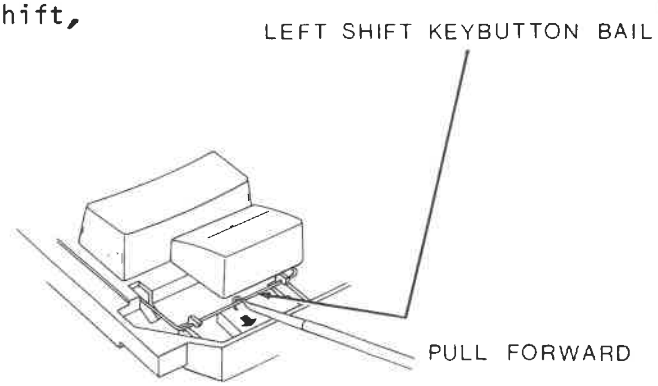
PRYING UP ON A KEYBUTTON DAMAGES THE STRIKER SPRING. IF A STRIKER SPRING GETS DAMAGED, THE ENTIRE KEYBOARD MUST BE REPLACED.

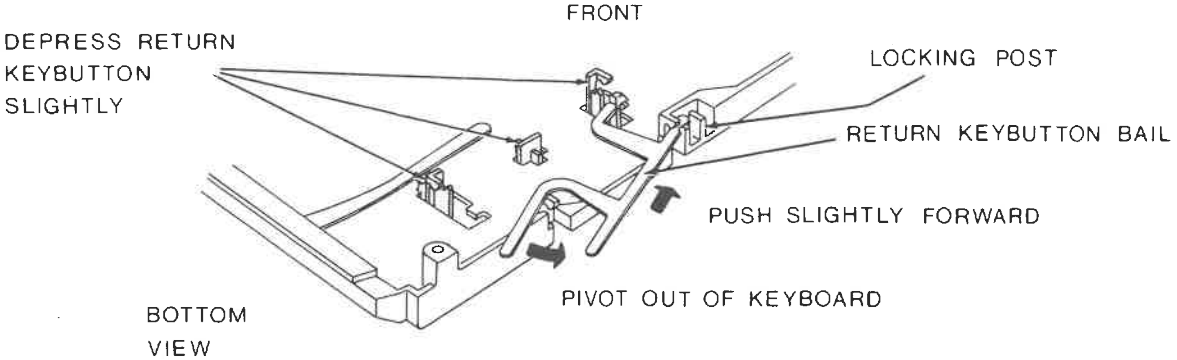
A. Remove the Keyboard from the Casing Base. Removal of the Keyboard Base Plate is not necessary, but the illustrations in this procedure show it removed.

B. When removing the Spacebar, Left Shift, or Return Keybutton, remove the Keybutton Bail first:

1) For the Spacebar or Shift Keybutton, use a Spring Hook on the Wire Bail, and pull forward to disengage the Bail from the Keyboard and Keybutton.

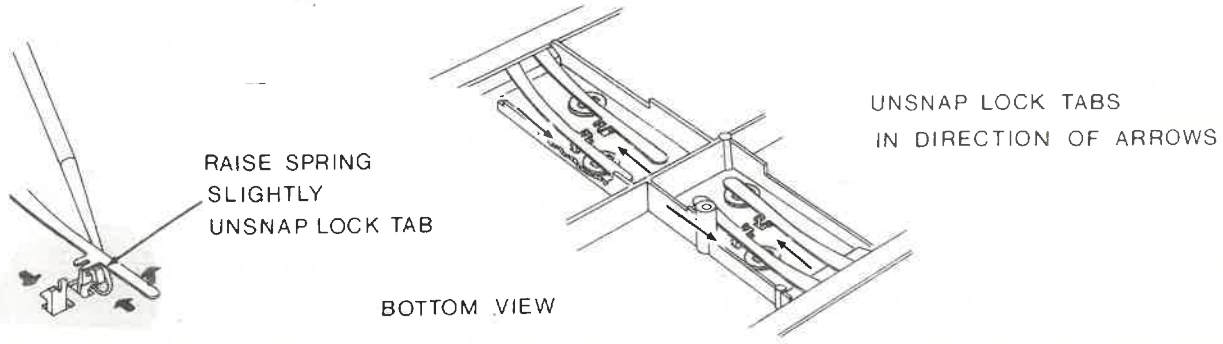
2) For the Return Keybutton, depress the Keybutton slightly, push gently forward on the Sheet Metal Bail, and pivot the Bail out of the Keyboard. BE CAREFUL NOT TO DAMAGE THE LOCKING POST WHEN PUSHING THE BAIL FORWARD.





4. KEYBOARD COMPONENT REMOVALS (continued)

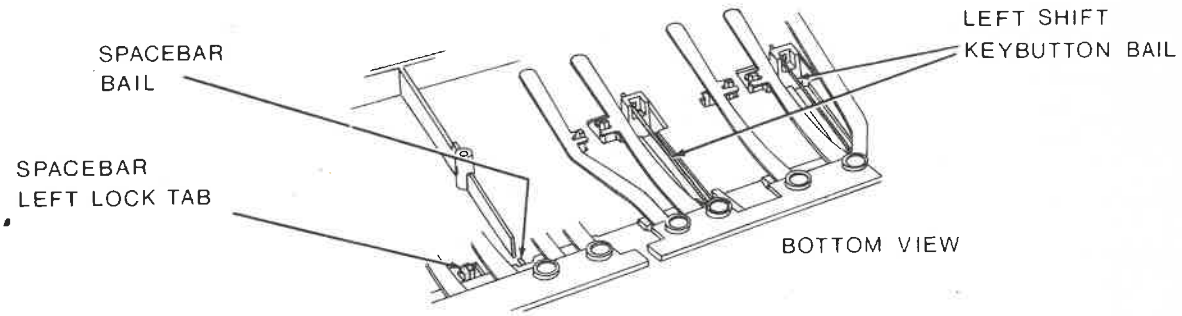
C. Turn the Keyboard upside down, and use a Spring Hook to raise the Striker Spring slightly to disengage it from the Keybutton. CAUTION: DO NOT RAISE THE STRIKER SPRING TOO FAR OR THE SPRING WILL GET DAMAGED. While holding the Spring away from the Keybutton, use the Spring Hook to unsnap the Keybutton Lock Tab from the Keyboard. The Keybutton drops out of the Keyboard Assembly. NOTE: The Spacebar has two Lock Tabs.



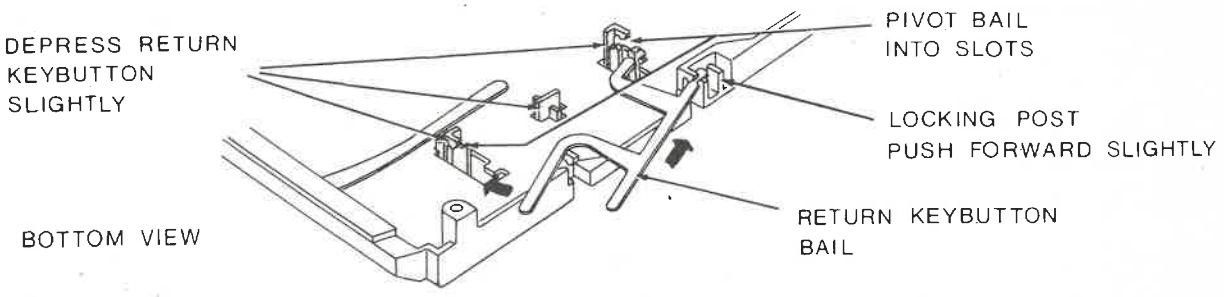
REPLACEMENT:

1. Align the Keybutton with the holes in the Keyboard, and snap the Keybutton in place.

2. a) When replacing the Spacebar or Left Shift Key Wire Bail, insert the Bail through the holes in the Keyboard. Make sure the ends of the Bail are properly aligned, and snap the front of the Bail into its locking tabs.



b) When replacing the Return Keybutton Sheet Metal Bail, depress the Keybutton slightly; gently push the end of the Bail slightly against the Keyboard post, and pivot the Bail into position. Make sure the Arms of the Bail seat in the Slots on the Keybutton.



c) Replace the Keyboard in the Casing Base.

5. LCD AND LCD HOUSING REMOVAL

1) Remove Mask/LCD Assembly from Casing Base (See Mask/LCD Removal)

2) Remove SCREW (5) and WASHER (6) from the underside of the Mask. Then remove the TOROID (7) and Ribbon Cable from STUD (8).

3) Unhook LCD RIBBON CABLE (10) and LCD GROUND CABLE (9) from the Cable RESTRAINT (11) on the Mask.

4) Wedge a Flat Tip Screwdriver between the Left MASK LCD SUPPORT (21) and the Left LOWER LCD HOUSING (22). Slightly twist the screwdriver and snap the LCD Housing from the Mask. Use the same procedure to snap the Right LCD Housing free from the Mask.

5) Remove two PLUGS (13) and two SCREWS (14).

6) Press down on the UPPER LCD HOUSING (12) and move it rearward to unsnap it from the LOWER LCD HOUSING (22).

7) Disconnect the LCD CONNECTOR (19) from the LCD and the INVERTER (4) from the EL Panel.

8) Remove six SCREWS (15) from the LCD, and remove the LCD Ground CABLE (9) and Ground SHIELD (16) from the LCD.

9) Lift the LCD (18) from the LOWER LCD HOUSING (22) and slide the EL PANEL (17) free of the LCD. NOTE: To remove the Plastic SLIDE (20) for the Contrast Control, lift up on top of Slide so it clears the stop and move the slide upward until it stops. SLIDE (20) will fall clear of Lower LCD Housing.

To remove the LCD CABLE ASSEMBLY (10) from the Mask:

10) Unwrap the three winds of the Ribbon Cable from the TOROID (7) and remove Toroid.

11) Feed the LCD Cable Assembly through the top side of the Mask.

REPLACEMENT: Reverse procedure. When reassembling the LCD in the Lower LCD Housing, be sure that the LCD contrast control actuator seats in the forks of the Plastic SLIDE (20) of the Lower LCD Housing. Also, make sure that all cabling is properly routed and that LCD Cable is wrapped properly around Toroid. Be sure EL Panel SLOT (1) seats on POST (2) and INVERTER (4) rest in Inverter WELL (3).

6. LCD HOUSING BRAKE ASSEMBLY REMOVAL

With upper LCD Housing flat on work surface, rotate Brake Assembly so it is 90 degrees to upper LCD Housing.

1) Spread BRAKE COLLAR (26) and remove from right side of UPPER LCD HOUSING (12).

2) Compress SPRING (25) and remove from LCD Housing.

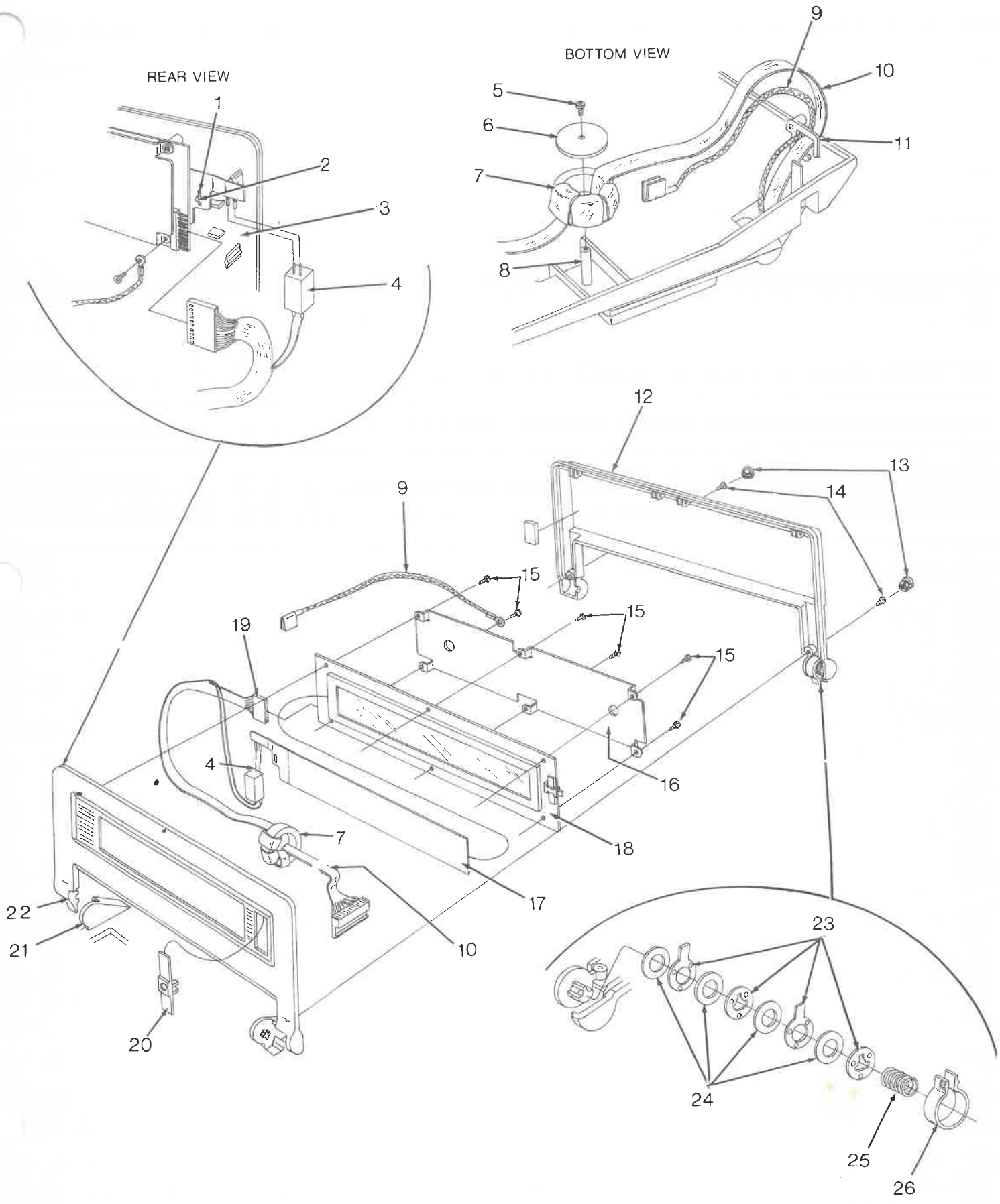
3) Remove DISKS (23) and CORK PADS (24) from right side of Upper LCD Housing.

REPLACEMENT: Proper reassembly is necessary for correct braking action.

A) Install the Disks and Cork Pads in the sequence illustrated. NOTE: Mold marks in the Plastic Disks should all face in the same direction.

B) Compress and install SPRING (25).

C) Install BRAKE COLLAR (26) with tapered corners facing out.


REAR VIEW
1
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BOTTOM VIEW
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26

7. CONTROL PC BOARD REMOVAL

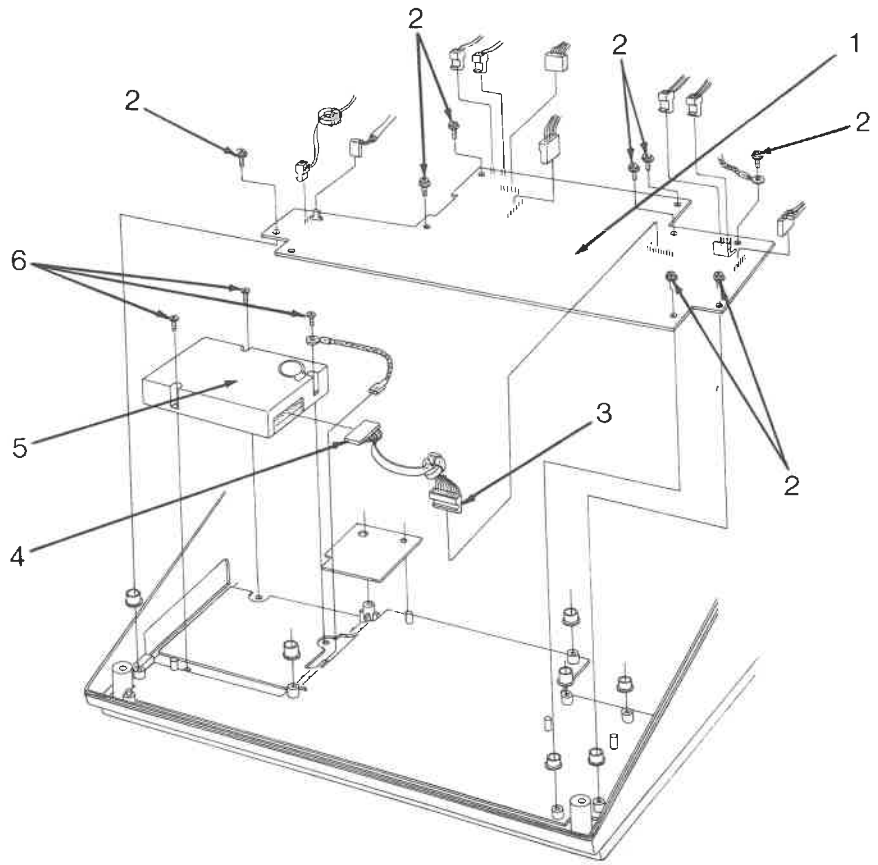
1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).

2) Disconnect all Connectors from CONTROL PC BOARD (1).

3) Remove SCREWS (2); free Ground Cables, and lift out CONTROL PC BOARD (1).

REPLACEMENT: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.

OBSERVE STATIC PRECAUTIONS



8. DISK DRIVE REMOVAL

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Disconnect DISK DRIVE CABLE CONNECTOR (3) from CONTROL PC BOARD (1).
3) Remove three SCREWS (6), free Disk Drive Ground Cable, and lift out DISK DRIVE (5). DISK DRIVE CABLE (4) can now be unplugged from Disk Drive.

REPLACEMENT: Reverse procedure.

9. FRAME ASSEMBLY REMOVAL (with Carrier & Paper Handling)

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).

2) Remove two SCREWS (3) and two FOOT RETAINERS (4) from Casing Base.

3) Remove two FRAME GROUND SCREWS (2) and Ground Wires from Frame.

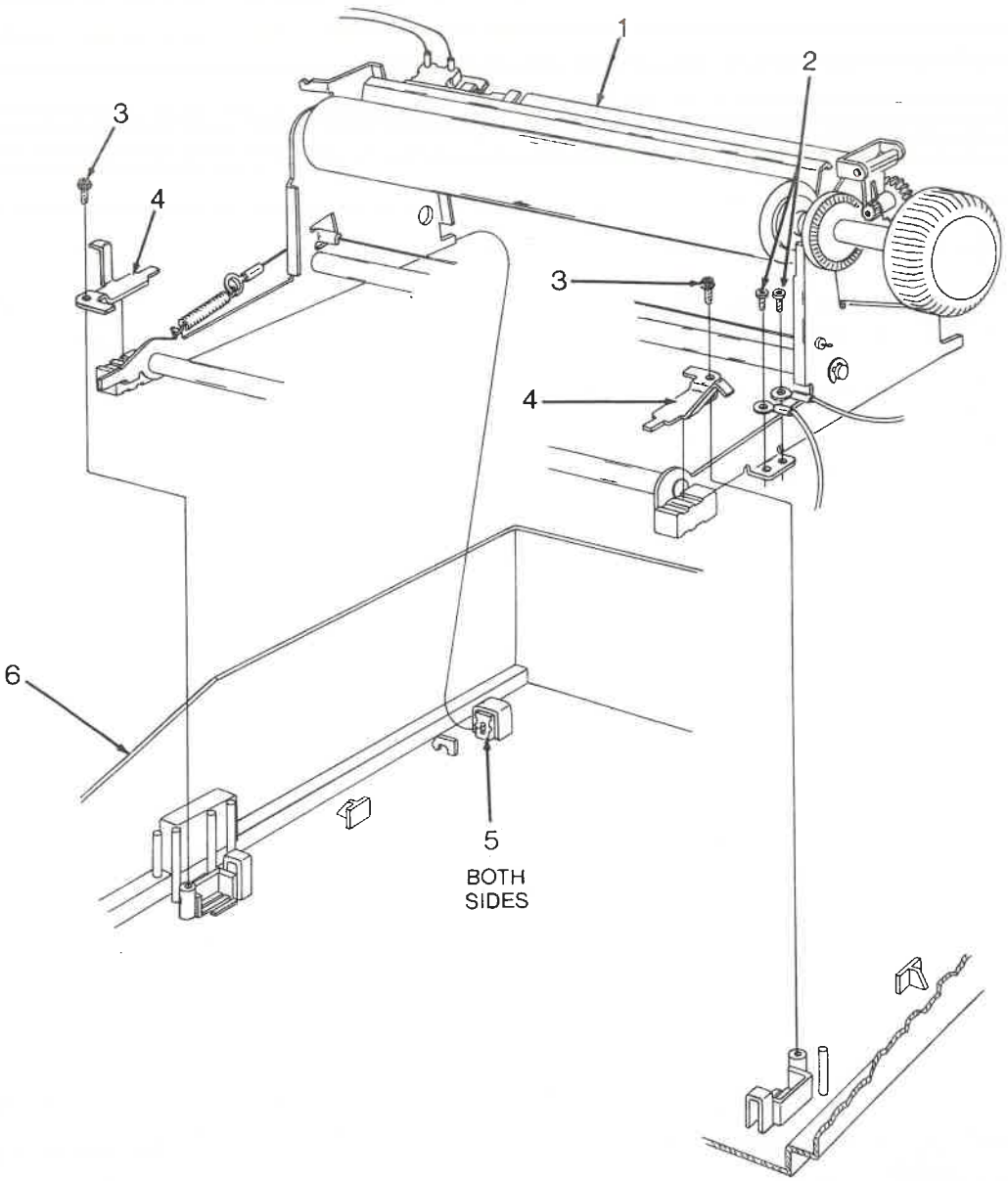
4) Disconnect Left End Switch Connector from Control PC Board and unhook wires from retainer in Casing Base.

5) Disconnect all Motor and Solenoid Connectors from Control PC Board.

6) Free Spiral Harness and component wires from Casing Base.

7) Lift FRAME ASSEMBLY (1) out of CASING BASE (6). NOTE: This requires some force since the fit is tight. The two rear FEET (5) of the Frames will remain in the Casing Base.

REPLACEMENT: Reverse procedure.



10. POWER SUPPLY REMOVAL

FUSE REMOVAL

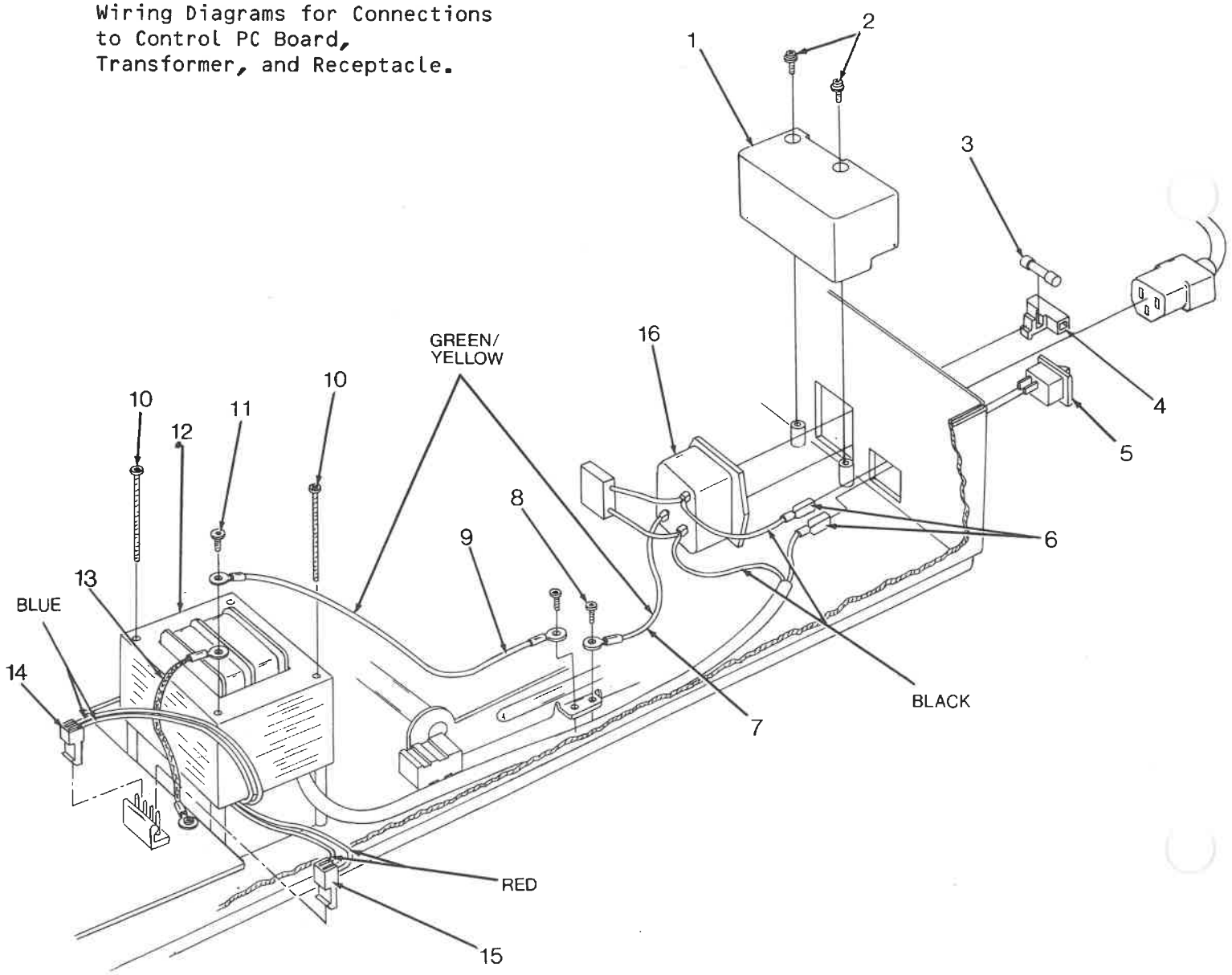
1) Snap out FUSE HOLDER (4) and remove FUSE (3).

TRANSFORMER & RECEPTACLE ASSEMBLY REMOVAL

1) Remove Mask/LCD Assembly (see Removals Index).
2) Remove two COVER SCREWS (2) and lift off POWER SUPPLY COVER (1).
3) Disconnect Switch CONNECTORS (6) from OFF-ON SWITCH (5).
4) Remove SCREW (8) and SCREW (11) to free GROUND WIRES (7), (9) & (13).
5) Disconnect CONNECTORS (14) & (15) from Control PC Board.
6) Remove two TRANSFORMER SCREWS (10).
7) Lift out TRANSFORMER (12) and RECEPTACLE (16).

REPLACEMENT: Reverse procedure.

NOTE: Power Supply parts are keyed to Guide Studs and Slots in the Casing Base. Refer to Wiring Diagrams for Connections to Control PC Board, Transformer, and Receptacle.



11. CORRECTION BAIL REMOVAL

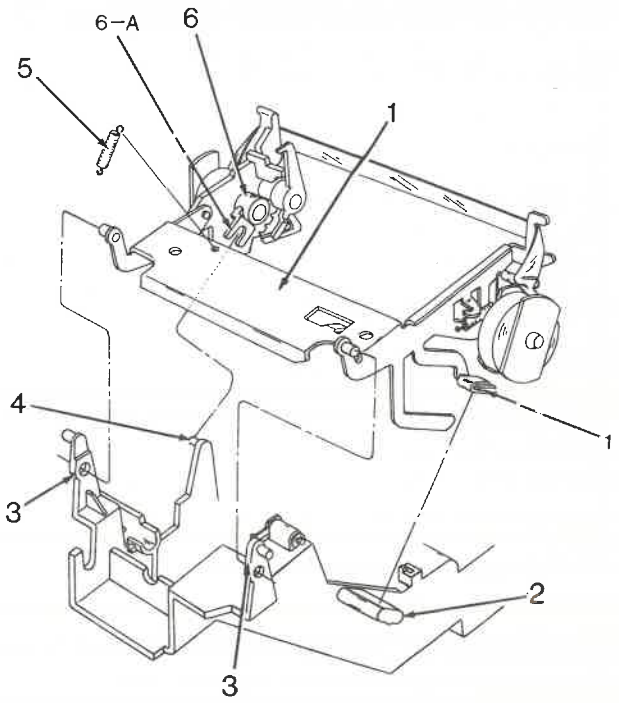
1) Remove Print Element and Ribbon Cassette. Correction Ribbon may be left in place.

2) Unhook SPRING (5) from Correction Bail.

3) Remove Correction Bail from Carrier by pushing out on Ribbon Cassette PIVOT MOUNTS (3). NOTE: CORRECTION FEED ARM (6) may drop off.

REPLACEMENT: Reverse procedure.

NOTE: Make sure FORK (6-A) of Correction Feed Arm engages STUD (4), and that DOWNSTOP TAIL (1-A) is on top of Bail DOWN STOP (2) on Carrier.



12. CORRECTION/CASSETTE RIBBON SOLENOID REMOVAL

1) Remove Frame Assembly and Correction Bail (see Removals Index).

2) Unhook SPRING (10) from RIBBON SOLENOID (11).

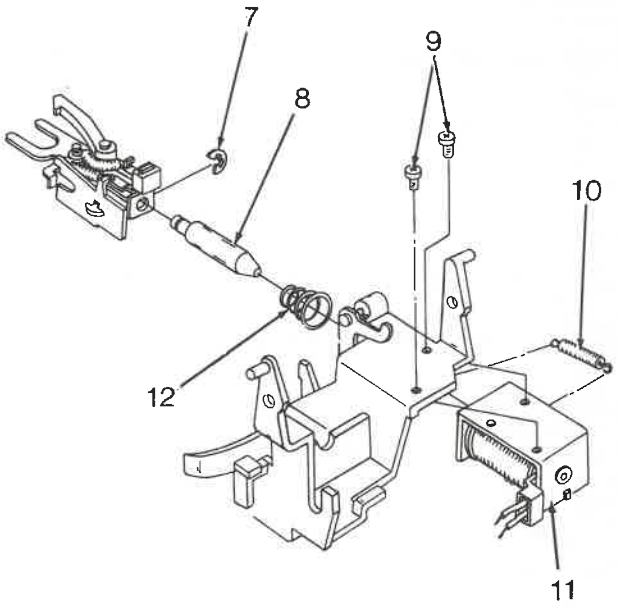
3) Remove two SCREWS (9) and lift out Solenoid.

4) Remove E-RING (7) from Solenoid Plunger. Lift out PLUNGER (8) and SPRING (12).

REPLACEMENT: Reverse procedure.

NOTE: Make sure SOLENOID SPRING (12) is installed as shown in illustration, and that SPRING (10) is in "V" Slot of Ribbon Solenoid.

ADJUSTMENTS BROKEN: Correction Ribbon Lift Adjustment (Adjustment #7).



13. RIBBON MECHANISM REMOVAL

NOTE: RIBBON DRIVER (1) may be removed from Ribbon Driver Assembly with no other removals by pulling it straight up out of Assembly with a pair of Needle Nose Pliers. SPRING (2) may fall free. Use Needle Nose Pliers to replace RIBBON DRIVER (1).

1) Remove Frame Assembly, Correction Bail, and Correction/Cassette Ribbon Solenoid (see Removals Index).

2) Remove SCREW (10), E-RING (8), STUD (6), and CORRECTION LIFT BELLCRANK (7).

3) Lift out Ribbon Shaft Assembly from CARRIER MOLDING (9).

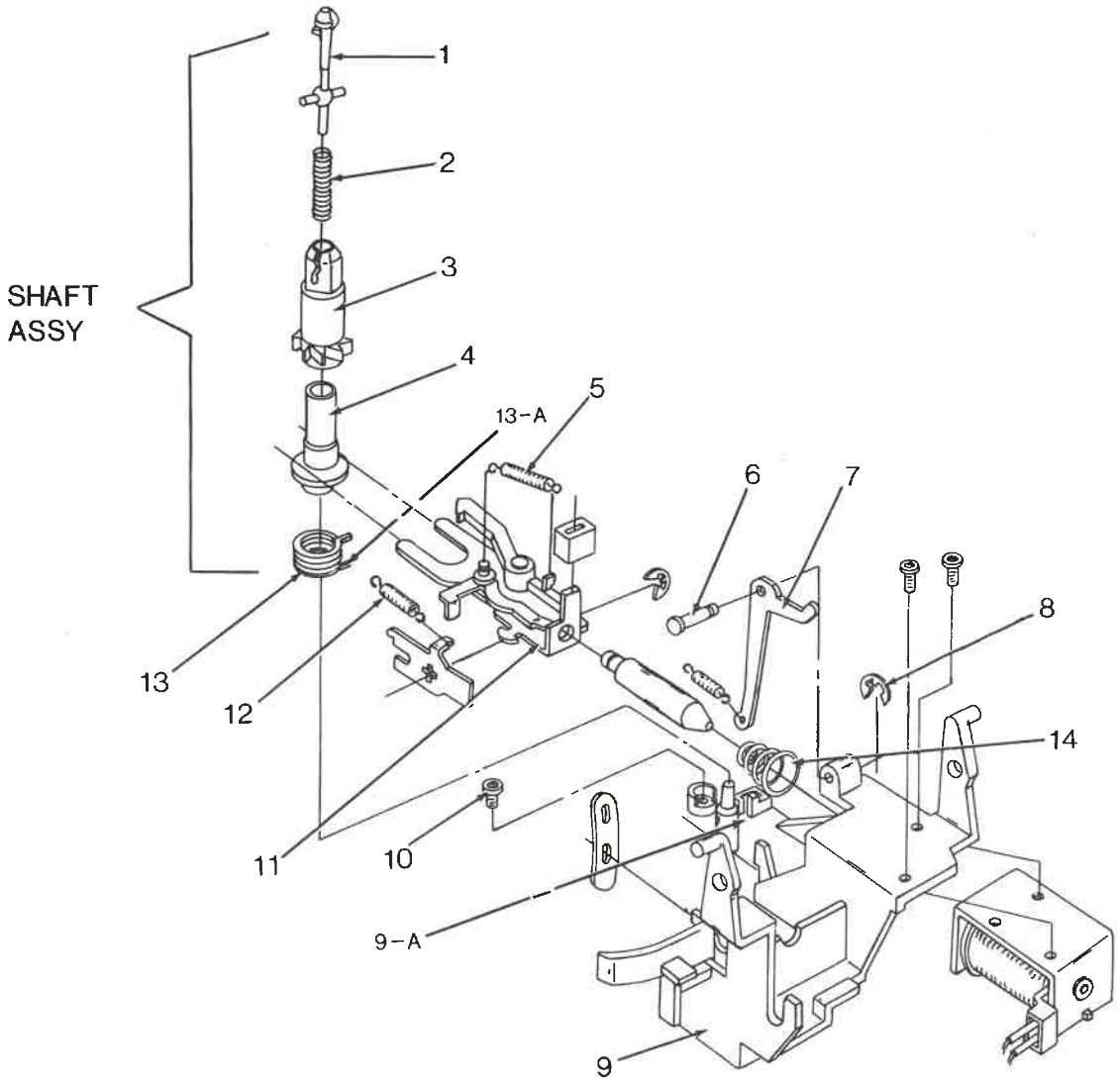
4) Remove RIBBON DRIVE RATCHET HUB (3) from RIBBON FEED SHAFT (4) by pulling apart.

5) Remove ANTI BACKUP FEED SPRING (13) from RIBBON FEED SHAFT (4).

6) Remove RIBBON FEED SPRING (5) and BLACK LATCH SPRING (12) from RIBBON FEED ASSEMBLY (11).

REPLACEMENT: Reverse procedure. NOTE: SPRING TAB (13-A) seats in molded NOTCH (9-A) in CARRIER MOLDING (9). Also, make sure SOLENOID SPRING (14) is installed as shown in illustration.

ADJUSTMENTS BROKEN: Correction Ribbon Lift Adjustment (Adjustment #7).



14. HAMMER SOLENOID ASSEMBLY REMOVAL

1) Remove Correction Bail (see Removals Index).

2) Remove RIBBON GUIDE (1) from Hammer PIVOT NUTS (4) and EAR (2-A).

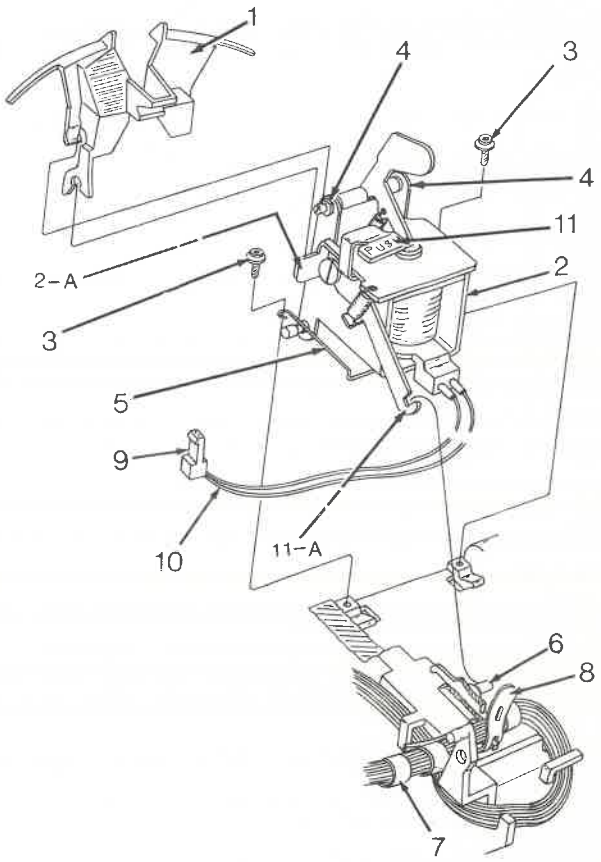
3) Unhook WIRE STRAP (8) from Carrier.

4) Remove two SCREWS (3) and RETAINING WIRE (5).

5) Press PUSH LEVER (11) downward slightly, and lift HAMMER SOLENOID ASSEMBLY (2) out of Carrier.

6) Remove two HAMMER WIRES (10) from spiral WIRE BINDER RETAINER (7).

7) Disconnect Hammer Solenoid CONNECTOR (9) from Control PC Board.



REPLACEMENT: Reverse procedure.
NOTE: Formed area of Retaining Wire fits under Lip of Carrier Molding, and STUD (6) fits in SLOT (11-A).

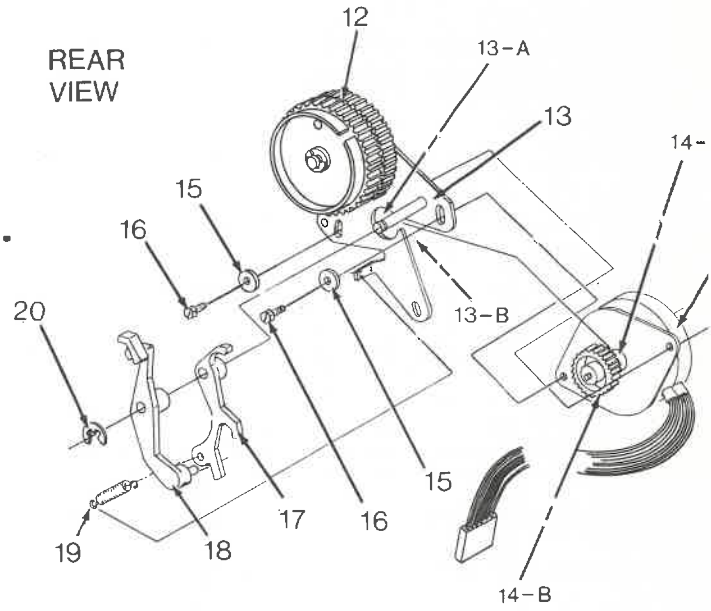
15. ELEMENT MOTOR REMOVAL

1) Remove Frame Assembly (see Frame Assembly Removal).

2) Unhook SPRING (19). Remove 'E' RING (20), HOME POSITIONER (18) and ACTUATOR (17).

3) Remove two SCREWS (16) and two WASHERS (15).

4) Push ELEMENT MOTOR (14) forward to disengage BEARING (14-A) from HOLE (13-A) in MOTOR BRACKET (13), and slide Motor out through SLOT (13-B).



REPLACEMENT:

A) Wind ELEMENT SCISSOR GEARS (12) against spring tension and hold Gears.

B) Slide ELEMENT MOTOR (14) through BRACKET SLOT (13-B), and push MOTOR (14) rearward so BEARING (14-A) seats in BRACKET HOLE (13-A) while making sure DRIVE GEAR (14-B) meshes with SCISSOR GEARS (12). Release Scissor Gears after Bearing is seated and Gears are meshed.

C) Reassemble remaining components in reverse sequence.

ADJUSTMENTS BROKEN: Element Motor Position (Adjustment #2).

16. ELEMENT DRIVE SHAFT AND BEARINGS REMOVAL

1) Remove Element Motor and Hammer Solenoid Assembly (see Removals Index).

2) Remove E-RING (1), Outer SCISSOR GEAR (2), and SPRING (3).

3) Pry off Inner SCISSOR GEAR (4). NOTE: This Gear must be replaced with a new one after prying it off.

4) Remove two SCREWS (5).

5) Pivot STUD (6-A) out of SLOT (10-A) in CARRIER MOLDING (10), and remove BRACKET (6), BEARING RETAINER (7), BEARINGS (8), SPRING (9), WASHER (11), and ELEMENT DRIVE SHAFT ASSEMBLY (12). CAUTION: Carefully remove BRACKET (6) to overcome SPRING (9) tension.

REPLACEMENT:

A) Insert ELEMENT DRIVE SHAFT (12) with WASHER (11) through Drive Shaft Hole in CARRIER MOLDING (10).

B) Reassemble BEARINGS (8), SPRING (9), BEARING RETAINERS (7), and BRACKET (6) on Drive Shaft. NOTE: Smaller diameter of BEARINGS (8) fit into RETAINERS (7). Shoulder End of RETAINERS (7) seats in SPRING (9).

C) Replace two SCREWS (5).

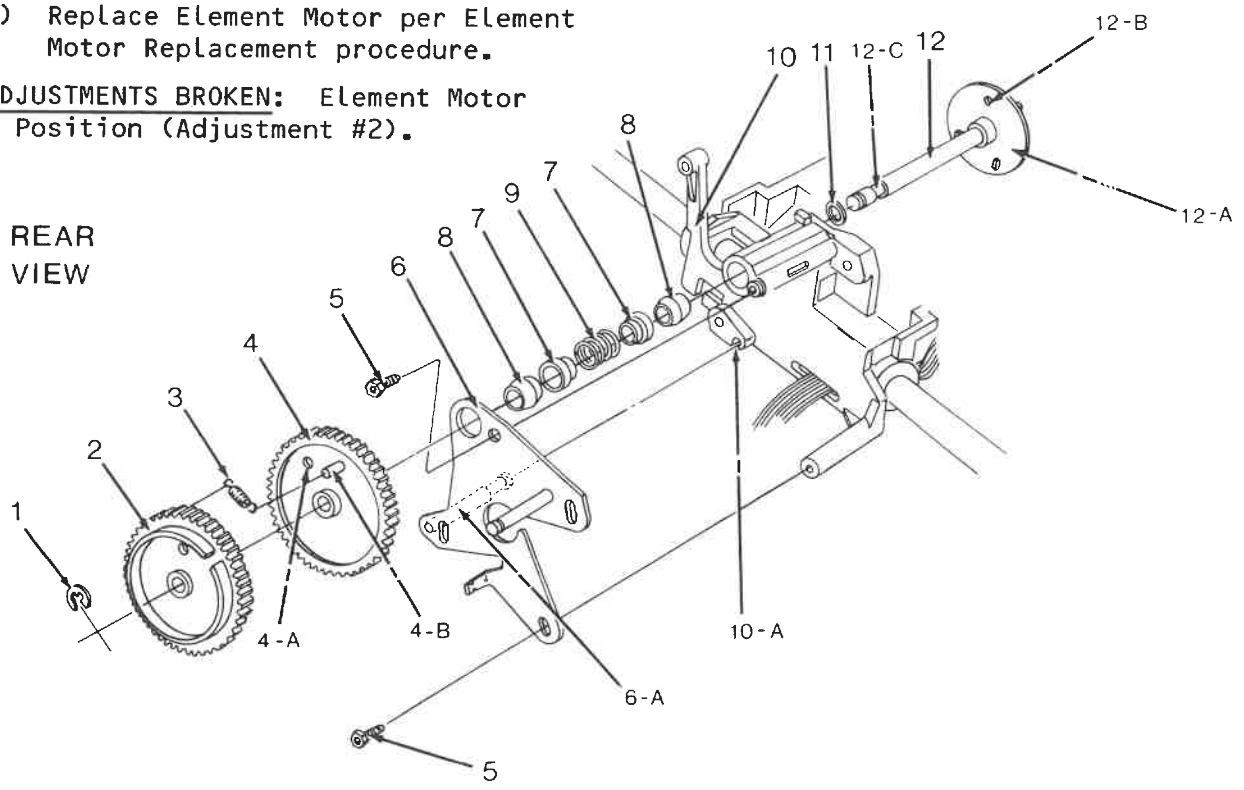
D) Rotate DRIVE DISC (12-A) so that Round HOLE (12-B) is at 12 o'clock position. Hold new Inner SCISSOR GEAR (4) with HOLE (4-A) at about 11 o'clock position as viewed from the rear (Arrow molded inside gear should be parallel with the Rear Frame Crosspiece), and press Gear onto Drive Shaft until it bottoms on Drive Shaft SHOULDER (12-C). NOTE: This positioning assures that Element Motor will be within adjustment range when reassembled.

E) Assemble SPRING (3) to Inner GEAR SPRING ANCHOR (4-B) with other Spring Loop facing HOLE (4-A). Place Outer GEAR (2) on SHAFT (12), hook Spring Loop with Outer Gear Spring Anchor, and twist Gears until Spring Anchors fit in Gear Holes: Assemble E-RING (1).

F) Replace Hammer Solenoid Assembly.

G) Replace Element Motor per Element Motor Replacement procedure.

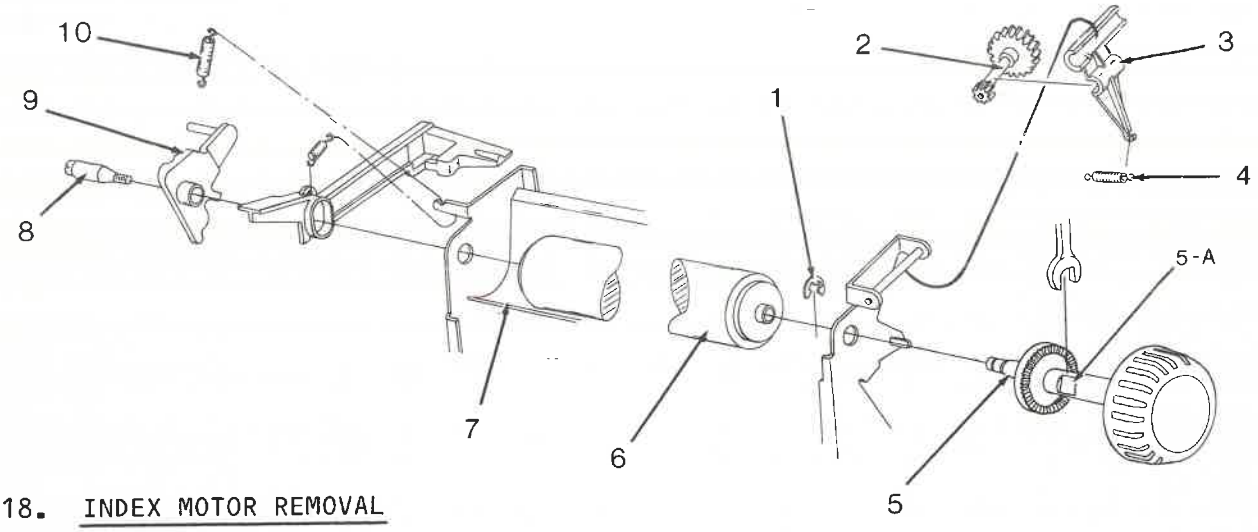
ADJUSTMENTS BROKEN: Element Motor Position (Adjustment #2).



17. PLATEN AND PAPER TABLE REMOVAL

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Unhook SPRING (4) from LINESPACE PINION PIVOT (3). Remove PIVOT (3) and LINESPACE PINION ASSEMBLY (2).
3) Unhook SPRING (10) and remove PAPER RELEASE LEVER (9).
4) Remove E-RING (1).
5) Hold PLATEN KNOB SHAFT (5) with a 3/8" wrench over square portion of KNOB SHAFT (5-A) and remove SCREW (8). NOTE: If you hold the Platen Knob, it will likely break when loosening SCREW (8).
6) Hold PLATEN (6) and unscrew PLATEN KNOB SHAFT (5).
7) Lift out PLATEN (6) and PAPER TABLE (7).

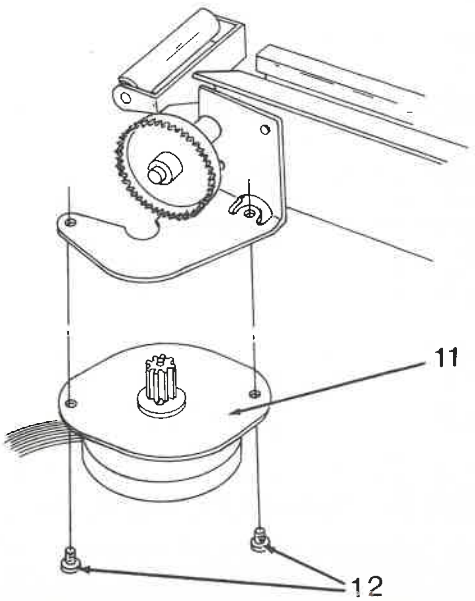
REPLACEMENT: Reverse procedure. NOTE: Stud in Paper Table seats in Hole in Paper Release Shaft.



18. INDEX MOTOR REMOVAL

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Remove SCREWS (12) and lift out INDEX MOTOR (11).

REPLACEMENT: Reverse procedure. NOTE: Make sure Motor Gear meshes with Intermediate Gear.



19. CARRIER MOTOR AND CARRIER CAPSTAN/DRIVE CABLE ASSEMBLY REMOVAL

1) Remove Frame Assembly and Carrier Molding (see Removals Index).

2) Remove Right Line Indicator SCREW (4).

3) Remove two SCREWS (8).

4) Unhook SPRING (1).

5) Remove CABLE ANCHOR (15-C) from Right Frame, and lift out CAPSTAN BRACKET (10) and CARRIER MOTOR (9). Remove Carrier Motor from Bracket.

6) Remove NUT (6), SCREW (7), and Capstan/Scissor Gear Assembly from BRACKET (10).

7) Remove C-CLIP (12), SCISSOR GEAR (13), and SPRING (14) from CAPSTAN/DRIVE CABLE ASSEMBLY (15).

REPLACEMENT:

A) Pull Cable through Capstan until mark on Cable appears in Front Capstan SLOT (15-D). If there is no mark on the Cable, mark the Cable approximately 14.1" (14 1/8") from the inside of the ring terminal to the window of the capstan pulley. Wind Spring End of Cable 3 3/4 TO 4 winds clockwise in Grooves of CAPSTAN (15).

Hold wound Cable in place and wind other end of Cable three turns counterclockwise in Grooves of Capstan. Make sure Cable windings do not cross. Install CARRIER CAPSTAN CLIP (P/N 250159) to hold Carrier Windings in place.

B) Reassemble CAPSTAN (15), SPRING (14), SCISSOR GEAR (13), C-CLIP (12), SCREW (7), and NUT (6) to BRACKET (10).

C) Wind SCISSOR GEAR (13) against spring tension, hold Gear, and insert CARRIER MOTOR (9) through Hole in BRACKET (10). Hold Carrier Motor Gear in mesh with Scissor Gears.

D) Thread SPRING ANCHOR (15-A) through CARRIER MOLDING (5) and assemble BRACKET (10) and SCREWS (8) to CARRIER MOLDING (5).

NOTE: BRACKET (10) is keyed to fit on Carrier Molding.

E) Assemble CABLE ANCHOR (15-C) to Right Frame.

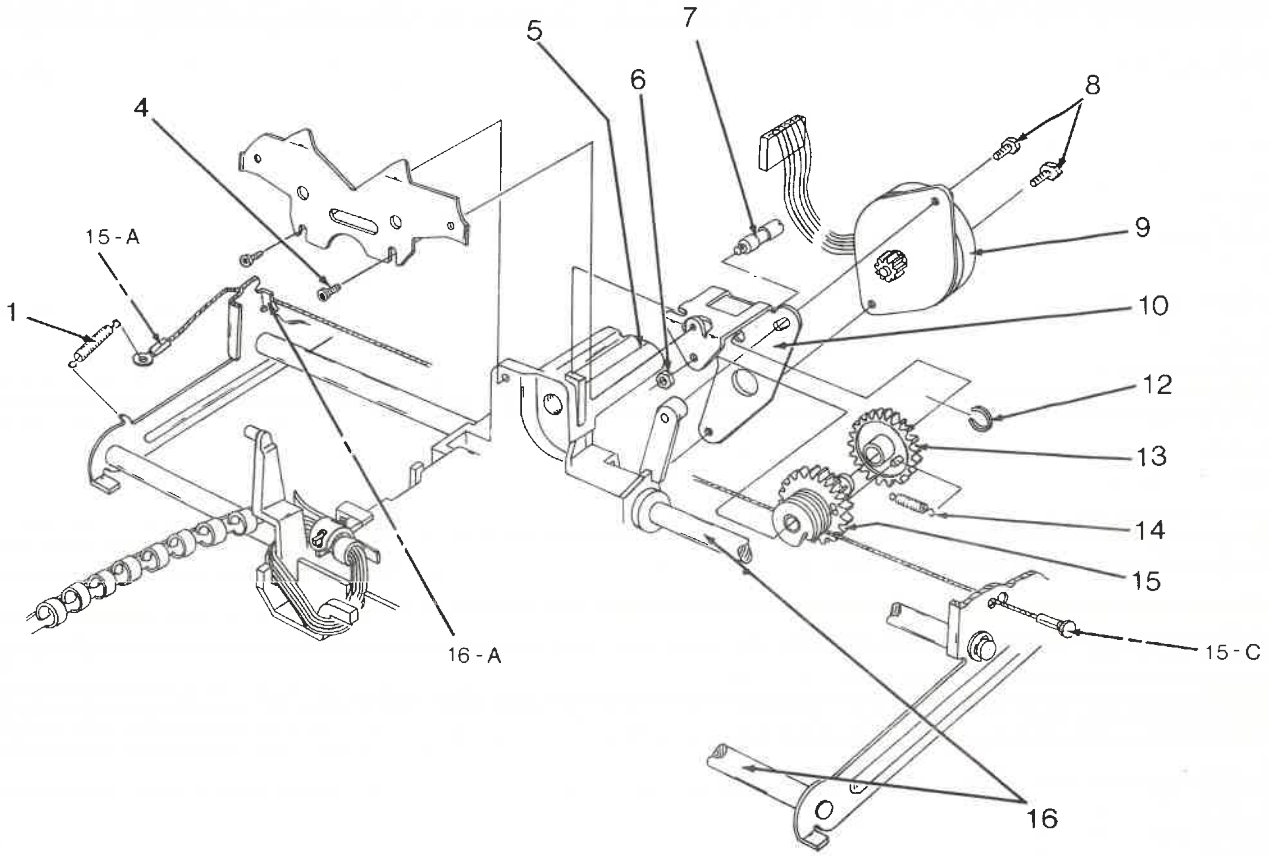
F) Hook SPRING (1) to SPRING ANCHOR (15-A) and route CABLE (15-B) around GUIDE (16-A): Hook SPRING (1) to Left Frame.

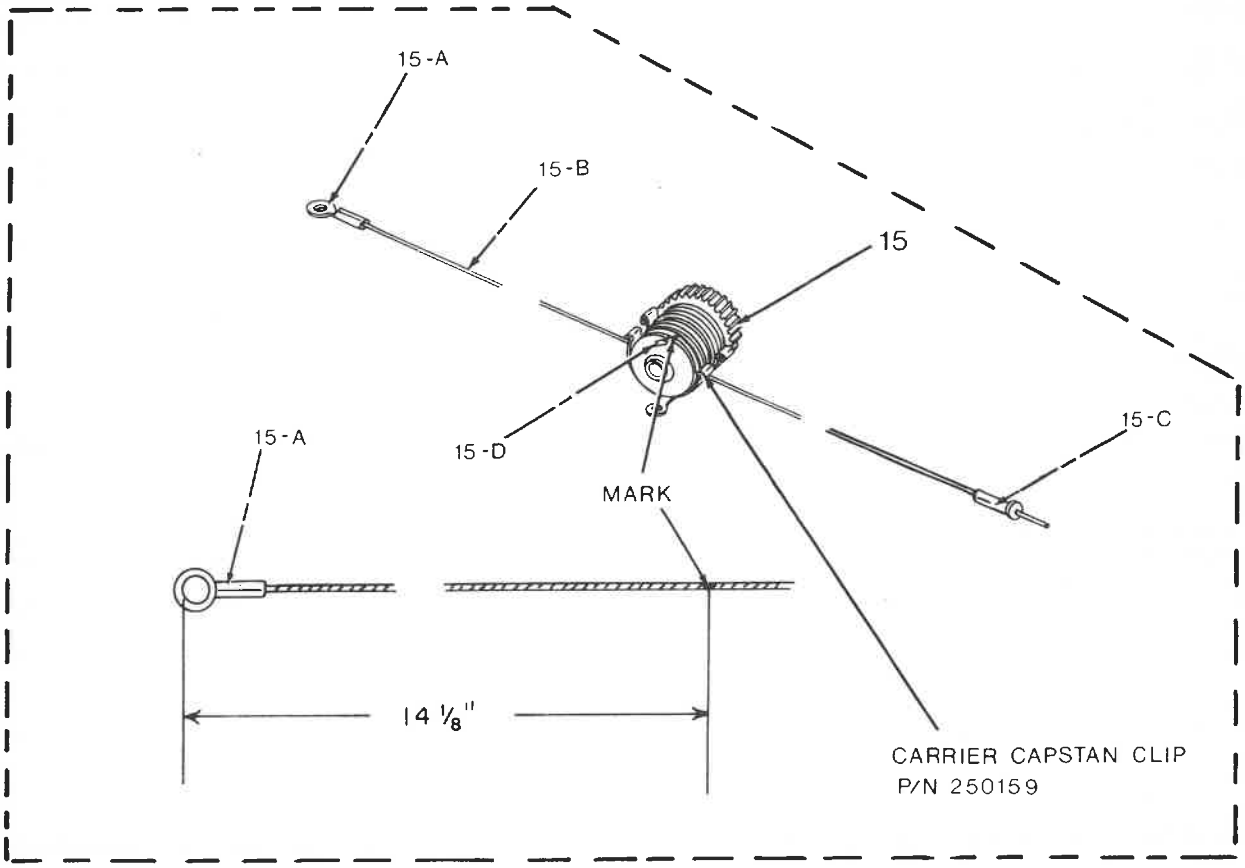
G) Move Carrier to the left to remove Carrier Capstan Clip. Run Carrier back and forth the full length of the Rails several times to exercise Cable.

H) Reassemble remaining parts in reverse sequence.

NOTE: Lubricate Cable Groove in Side Frame and Stud (see page 3-3).

ADJUSTMENTS BROKEN: Line Indicator Position (Adjustment #8).


1
4
5
6
7
8
9
10
12
13
14
15
15-A
15-C
16
16-A


15-A
15-B
15
15-D
15-C
15-A
MARK
14 1/8"
CARRIER CAPSTAN CLIP
P/N 250159

20. CARRIER MOLDING REMOVAL

1) Remove Frame Assembly, Capstan Cable, Platen, and Paper Table (see Removals Index).

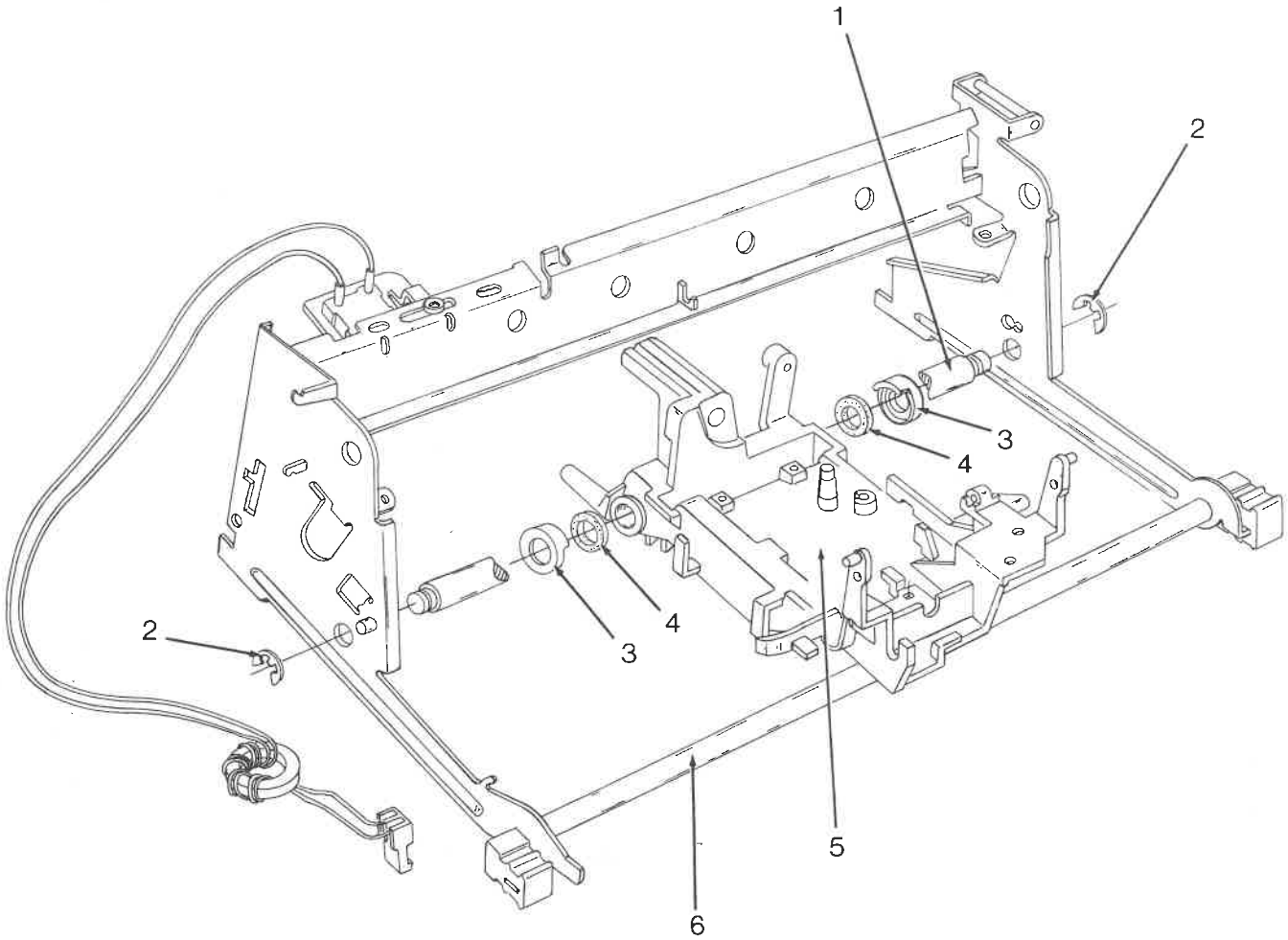
2) Remove two E-RINGS (2), from REAR RAIL (1).

3) Disengage CARRIER MOLDING (5) from FRONT RAIL (6), and slide REAR RAIL (1) out of Carrier Molding.

4) Snap off two FELT RETAINERS (3), and remove two FELTS (4).

REPLACEMENT: Reverse procedure. NOTE: To replace Carrier Molding, remove all components from Molding (see Removals Index). For replacement, reverse procedures.

ADJUSTMENTS BROKEN: 2, 4, & 8.



SECTION 5

ADJUSTMENTS

ADJUSTMENT INDEX

Sequential Adjustment Branch Display	Adjustment	Page
1	1. Left End Switch Adjustment	5-3
2 ↓ 3	2. Element Motor Position	5-3
	3. Hammer Center Position	5-4
4 ↓ 5	4. Hammer Assembly Position	5-5
	5. Ribbon Guide Position	5-5
6	6. Cassette Ribbon Position	5-6
7	7. Correction Ribbon Lift	5-6
8	8. Line Indicator Position	5-7
9	9. Line Indicator Clearance from Platen	5-7

An Arrow (——→) means "affects."

GENERAL ADJUSTMENT PROCEDURE: Casing Top removal is required for access to most checks and adjustments. Additional access requirements are noted when applicable.

All adjustments should be checked with Power Cord unplugged unless otherwise specified.

Circled reference numbers (i.e. (5)) in the illustrations indicate adjustment points.

SEQUENCE OF ADJUSTMENTS: Adjustments in this section are consecutively numbered and should be performed in sequence. Page 5-1 includes a Branch Display that shows sequence relationships among adjustments. The arrow (⟶) means "affects." For example:

2
↓
3

4

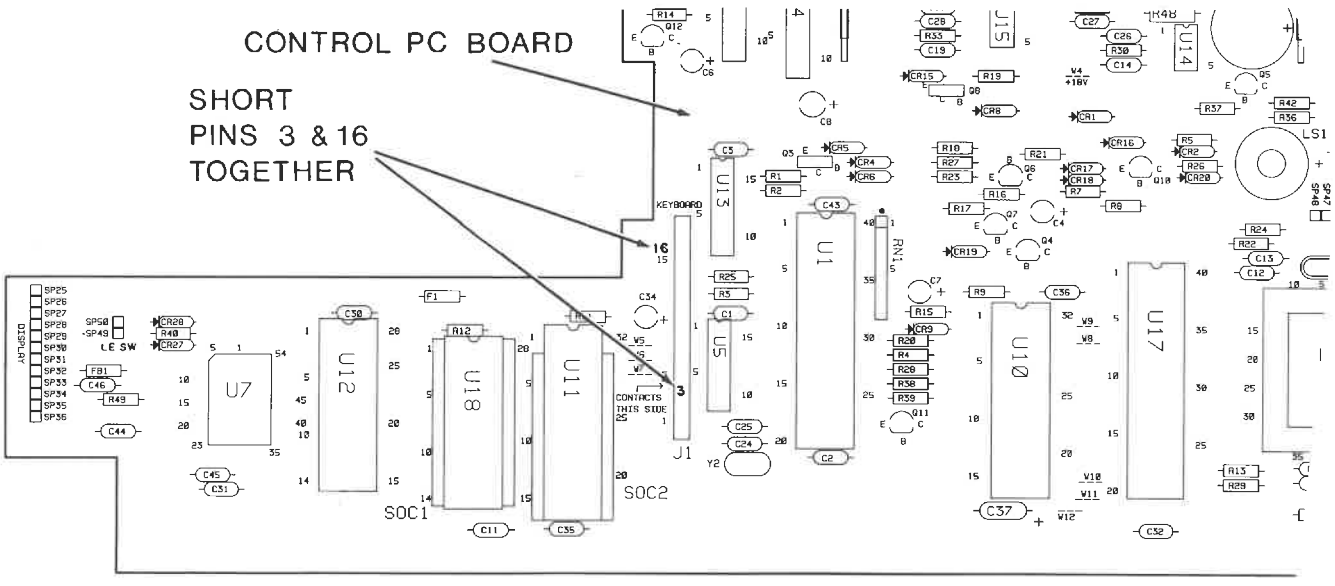
Read this display as follows: 2 affects 3; 3 & 4 affect no other adjustment;
3 depends on 2 being correct.

ENERGIZING ELEMENT MOTOR FOR ADJUSTMENTS: Two adjustments require energizing the Element Motor. To energize the Element Motor, hold down the "E" Keybutton and with Lid Switch Actuator released (or Lid closed), turn power on. Release the Keybutton: The Element Motor stays energized for one minute. After one minute, the Carrier moves to Space 12 and the Typewriter is ready for typing. This procedure may be repeated as often as necessary to make the adjustment.

SELF TYPING: The machine is equipped with a self typing program in the Electronics. When this program is activated, the machine prints out a line of characters, corrects a few character on the line, and performs a linespace and carrier return. During the third and fourth lines of self typing, the software part numbers are displayed in the LCD as part of an LCD function check. The machine will continue this self typing until power is turned off. Refer to Troubleshooting for a full description of this function.

To enter the Self Typing Mode, insure Lid Switch Actuator is released (or Lid closed) and hold the Return Keybutton down; then turn power on. Release the Keybutton after self typing begins.

If the Keyboard is disconnected from the machine, Self Typing can be entered by shorting together pins 3 & 16 on the Keyboard Connector J1 on the Control PC Board (illustrated below), release Lid Switch Actuator, and turn power on. Remove the wire after Self Typing begins.



1. Left End Switch Adjustment

REQUIREMENT:

When the Element rotates at the LEFT END SWITCH (3) during initialization, POSITIONER TAIL (1-A) should be approximately centered between the top and bottom of the POSITIONER ACTUATOR (5) Slot opening.

TO CHECK:

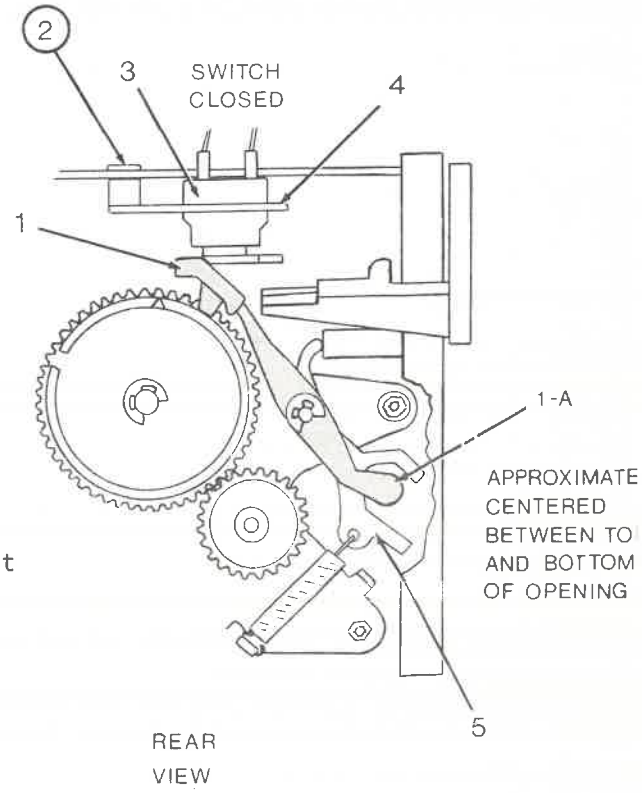
Turn Power on. As Element begins to rotate at Left End, turn Power off and check requirement.

ADJUSTMENT:

Loosen Lid Switch SCREW (2), place SWITCH BRACKET (4) in center of adjustment travel slot and tighten. Initialize machine and check requirement. If requirement is not met, loosen SCREW (2) and slightly move Switch Bracket left or right. Tighten Screw and recheck requirement.

FINAL CHECK:

Turn Power On. Carrier should move to Left End; Element should rotate to Home Character (e), and Carrier should move right to Preset Left Margin. Turn Power off.



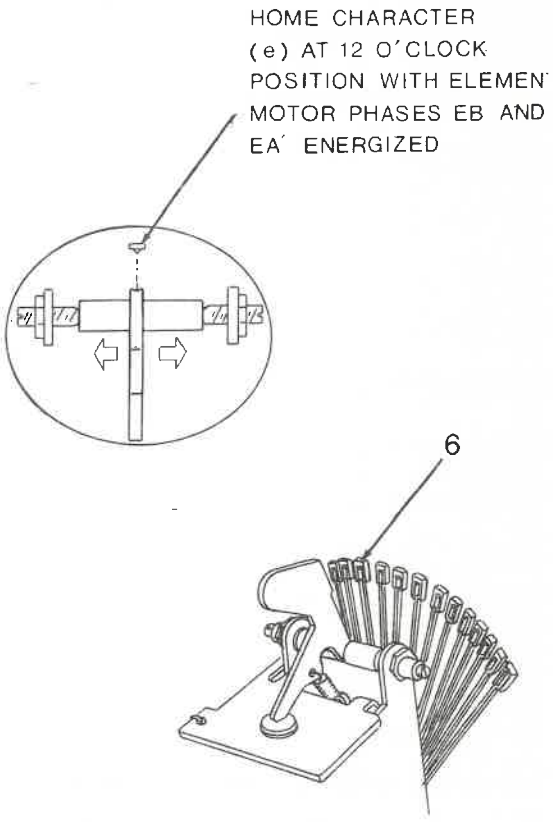
2. Element Motor Position

REQUIREMENT:

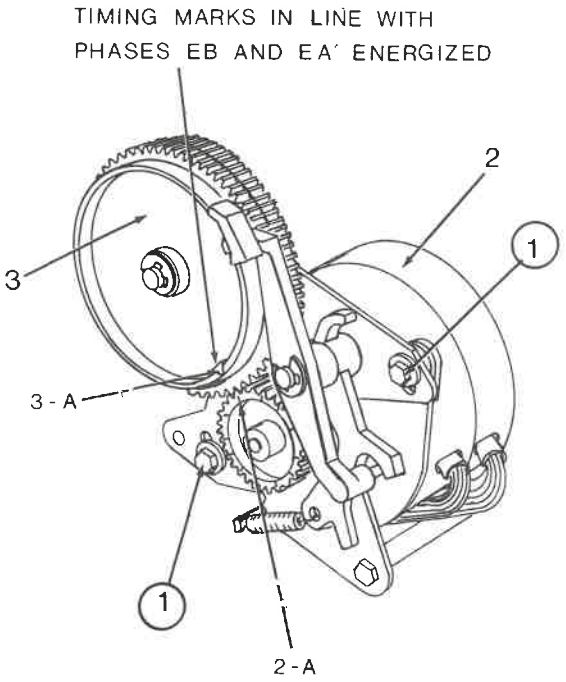
With Phases EB and EA' energized, Element Motor should hold the Home Character (e) ELEMENT PETAL (6) at 12 o'clock position.

TO CHECK:

Hold down the "E" Keybutton, and turn power on to energize the Element Motor for one minute. Home Character Element Petal should be at 12 o'clock position, and parallel with Hammer. Turn power off and repeat this procedure if more time is required.



2. Element Motor Position (continued)



ADJUSTMENT:

1. With power off, loosen two SCREWS (1).
2. Energize Element Motor Phases EB and EA' (refer to "TO CHECK" on page 5-3).
3. Rotate ELEMENT MOTOR (2) so that Home Character (e) Element Petal is at 12 o'clock position. MOTOR TIMING MARK (2-A) may align with TIMING MARK (3-A).
4. Hold Motor in position and tighten upper SCREW (1). Then tighten lower SCREW (1). Check position of Element Petal and fine adjust if necessary. Turn power off.

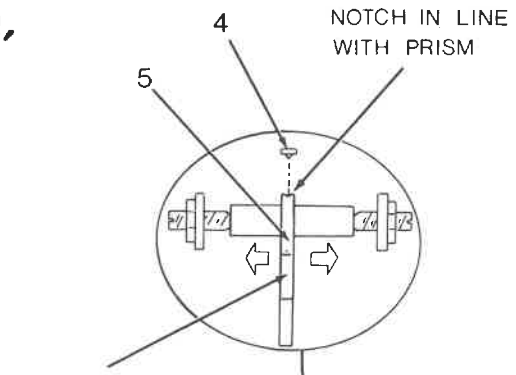
3. Hammer Center Position

REQUIREMENT:

A) With Element Motor Phases EB & EA' energized, notch of HAMMER (5) should align with Prism of ELEMENT PETAL (4).

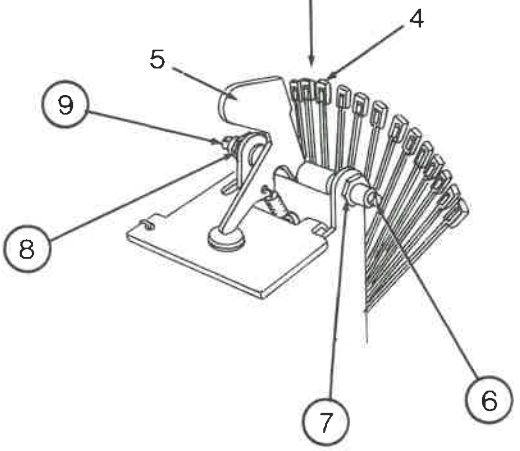
TO CHECK: Energize Element Motor Phases EB and EA' (refer to Adjustment #2 "TO CHECK" on page 5-3). Manually press HAMMER (5) against ELEMENT PETAL (4). Petal should not move left or right when Notch of Hammer engages Prism of Petal.

B) HAMMER (5) should be free on its pivots with no more than .0015" side play.



ADJUSTMENT:

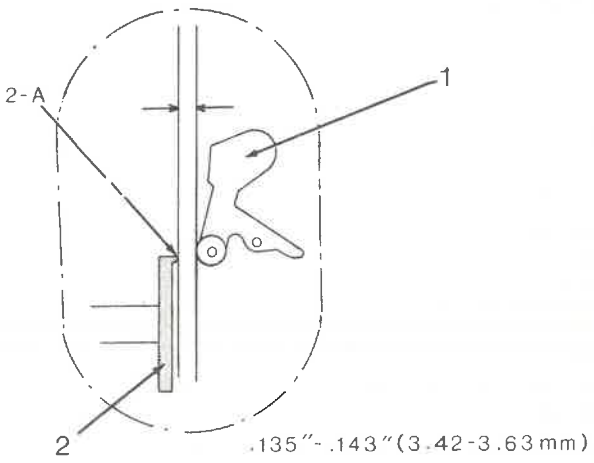
1. Energize Element Motor Phases EB and EA' (refer to Adjustment #2 "TO CHECK" on page 5-3).
2. Remove Ribbon Guide from Hammer Pivot Nuts.
3. Loosen NUTS (7) & (8) and regulate Right PIVOT SCREW (6) to meet Requirement A; tighten Right NUT (7).
4. Hold Hammer against Right PIVOT SCREW (6), and regulate Left PIVOT SCREW (9) to meet Requirement B; tighten Left NUT (8).
5. Replace Ribbon Guide onto Hammer Pivot Nuts.



4. Hammer Assembly Position

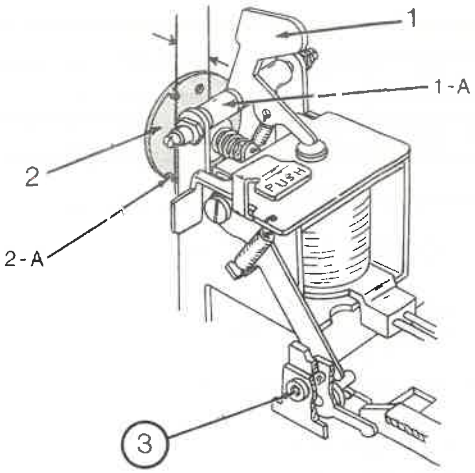
REQUIREMENT:

With HAMMER ASSEMBLY (1) latched in print position, there should be .135"-.143" (3.42-3.63 mm) clearance between Rear of HAMMER SHAFT (1-A) and ELEMENT DRIVER PADS (2-A). Check with Print Element and Ribbon Guide removed.



ADJUSTMENT:

1. Loosen RETRACTOR BRACKET SCREW (3).
2. Rotate ELEMENT DRIVER (2) so that one pad is opposite Hammer Shaft.
3. With HAMMER ASSEMBLY (1) latched in print position, insert a .139" Shim between HAMMER SHAFT (1-A) and DRIVER PAD (2-A).
4. Hold HAMMER ASSEMBLY (1) against Shim, and tighten SCREW (3).
5. Replace Ribbon Guide and Print Element.



5. Ribbon Guide Position

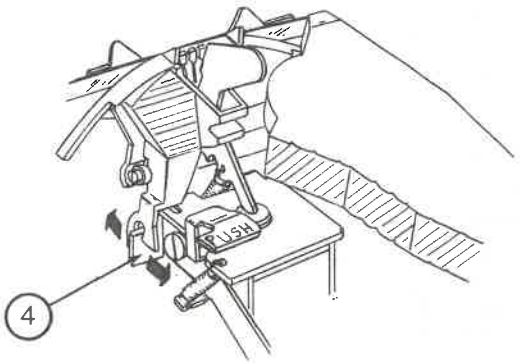
REQUIREMENT:

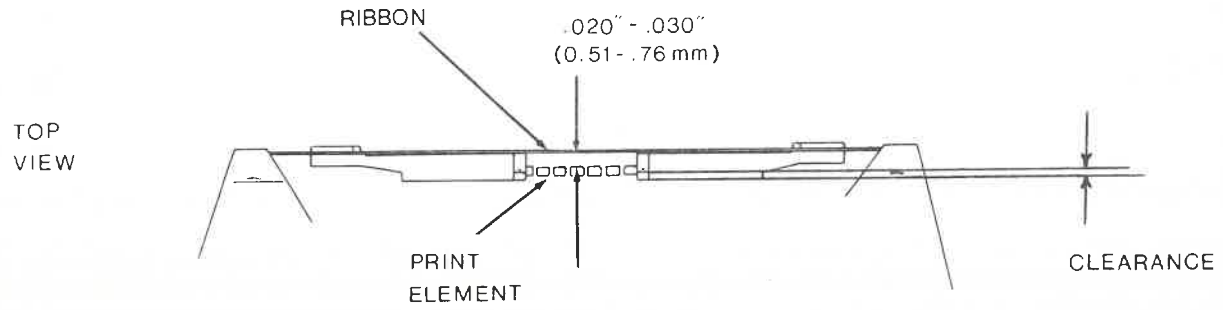
With a Ribbon Cassette in place, there should be .020"-.030" clearance between the Ribbon and the typeface of the Print Element.

NOTE: This should provide clearance between the Print Element and the inside surface of the Ribbon Guide.

ADJUSTMENT:

Form Hammer Solenoid EAR (4) forward or rearward to position Ribbon Guide.

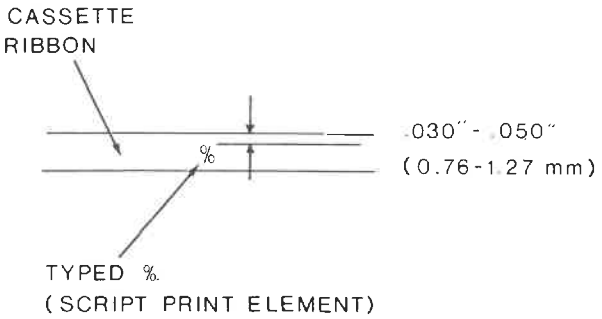




6. Cassette Ribbon Position

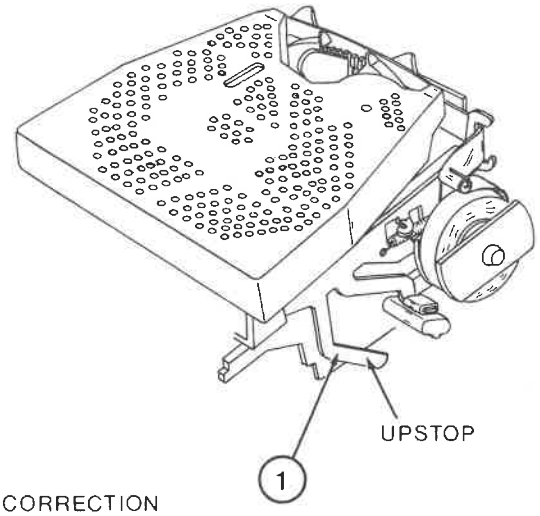
REQUIREMENT:

When typed with a Script Print Element, the top of the "%" character should be .030"-.050" from the top of the Cassette Ribbon.



ADJUSTMENT:

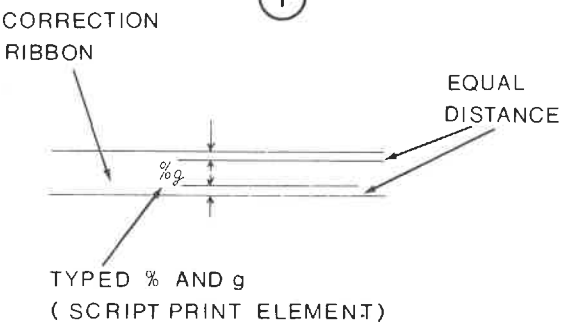
Form DOWNSTOP TAIL (1) on Correction Lift Bail up or down.



7. Correction Ribbon Lift

REQUIREMENT:

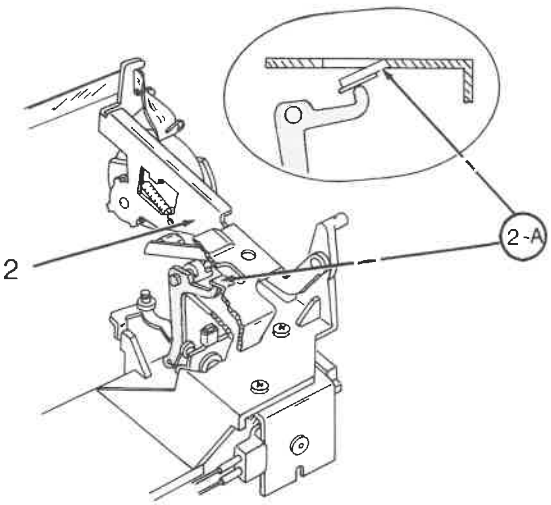
When correcting with a Script Print Element, the distance between the top of the "%" character and the top of the correction ribbon should equal the distance between the bottom of a lower case "g" and the bottom of the correction ribbon.



ADJUSTMENT:

Form ARM (2-A) on CORRECTION LIFT BAIL (2).

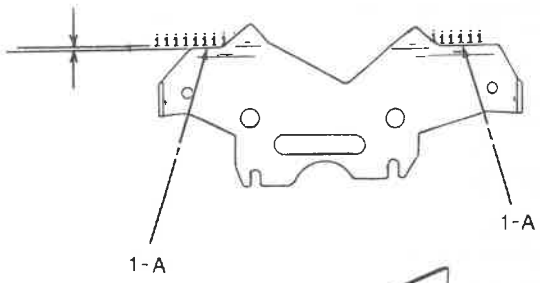
NOTE: Be sure Correction Lift Bail Upstop does not restrict motion of Bail.



8. Line Indicator Position

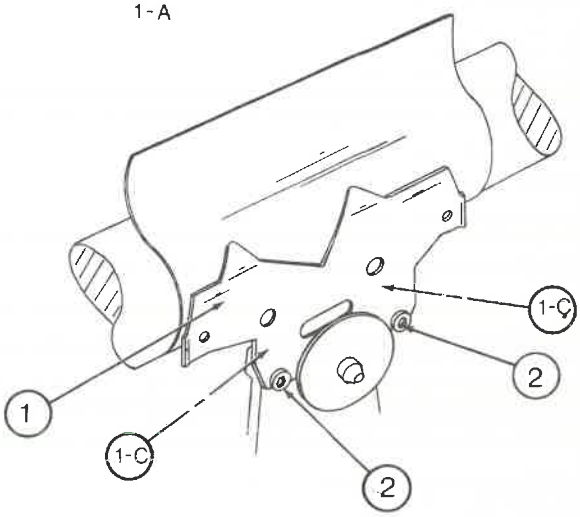
REQUIREMENT:

LINE INDICATOR SURFACES (1-A) should rest .005"-.015" below a row of printed "i's," and should be parallel with the typed characters.



ADJUSTMENT:

Position LINE INDICATOR (1) with attaching SCREWS (2).



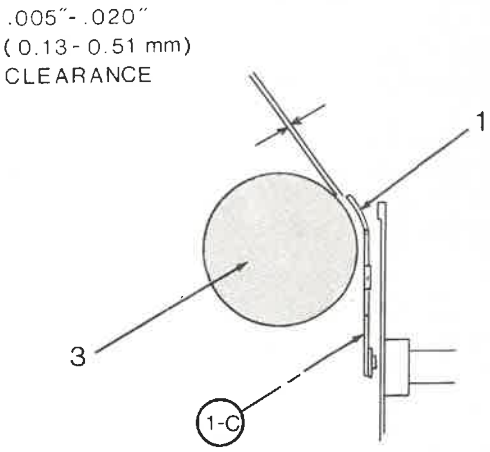
9. Line Indicator Clearance from Platen

REQUIREMENT:

There should be .005"-.020" clearance between LINE INDICATOR (1) and PLATEN (3).

ADJUSTMENT:

Form Left and Right LINE INDICATOR SURFACES (1-C) forward or rearward.



LEFT SIDE VIEW

SECTION 6

TROUBLESHOOTING

INDEX

SUBJECT	PAGE NUMBER(S)
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DC Voltage Checks	6-13
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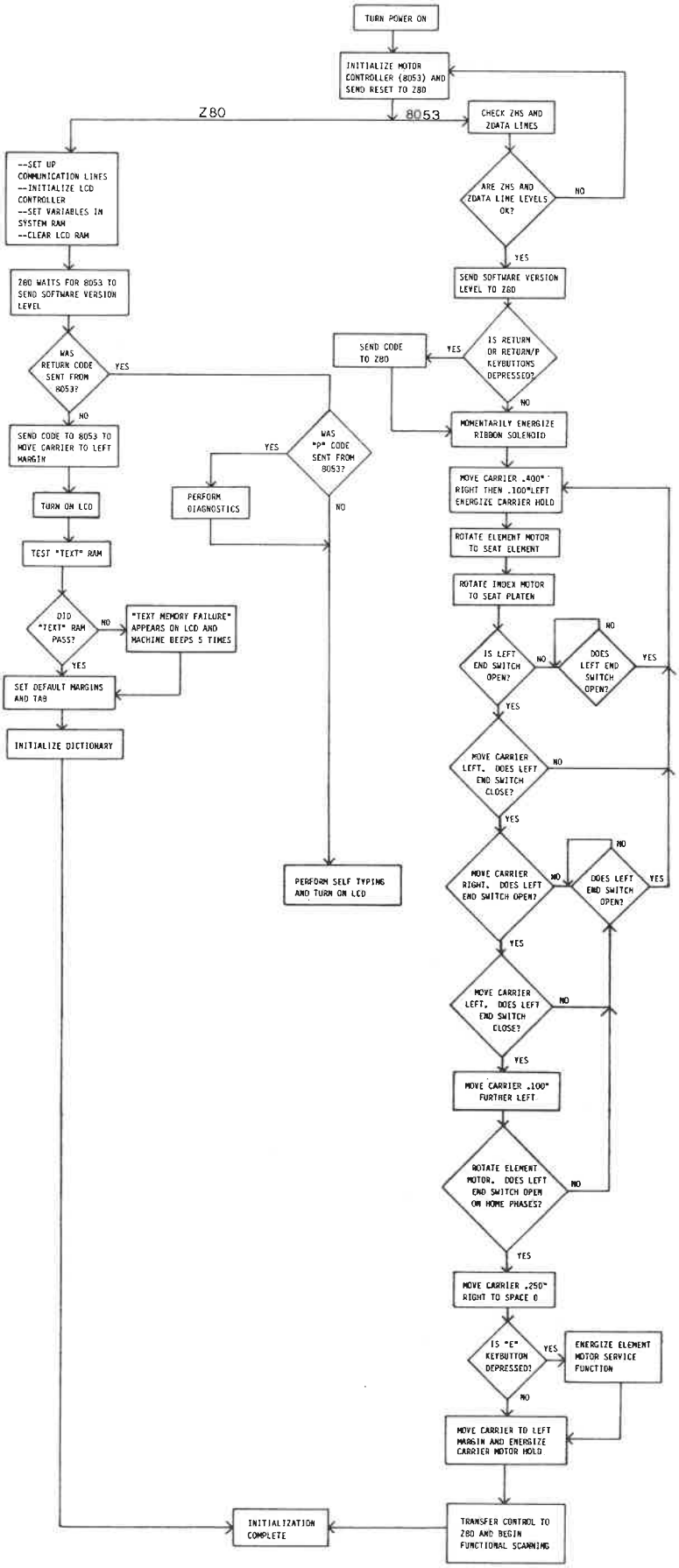
INITIALIZATION FLOW CHART


TURN POWER ON
INITIALIZE MOTOR CONTROLLER (8053) AND SEND RESET TO Z80
Z80
8053
CHECK ZHS AND ZDATA LINES
ARE ZHS AND ZDATA LINE LEVELS OK?
NO
YES
--SET UP COMMUNICATION LINES --INITIALIZE LCD CONTROLLER --SET VARIABLES IN SYSTEM RAM --CLEAR LCD RAM
SEND SOFTWARE VERSION LEVEL TO Z80
Z80 WAITS FOR 8053 TO SEND SOFTWARE VERSION LEVEL
IS RETURN OR RETURN/P KEYBUTTONS DEPRESSED?
YES
SEND CODE TO Z80
WAS RETURN CODE SENT FROM 8053?
YES
NO
MOMENTARILY ENERGIZE RIBBON SOLENOID
SEND CODE TO 8053 TO MOVE CARRIER TO LEFT MARGIN
WAS "P" CODE SENT FROM 8053?
YES
NO
MOVE CARRIER .400" RIGHT THEN .100"LEFT ENERGIZE CARRIER HOLD
PERFORM DIAGNOSTICS
TURN ON LCD
ROTATE ELEMENT MOTOR TO SEAT ELEMENT
TEST "TEXT" RAM
ROTATE INDEX MOTOR TO SEAT PLATEN
DID "TEXT" RAM PASS?
NO
"TEXT MEMORY FAILURE" APPEARS ON LCD AND MACHINE BEEPS 5 TIMES
IS LEFT END SWITCH OPEN?
NO
DOES LEFT END SWITCH OPEN?
NO
YES
YES
SET DEFAULT MARGINS AND TAB
INITIALIZE DICTIONARY
MOVE CARRIER LEFT. DOES LEFT END SWITCH CLOSE?
NO
YES
PERFORM SELF TYPING AND TURN ON LCD
MOVE CARRIER RIGHT. DOES LEFT END SWITCH OPEN?
NO
DOES LEFT END SWITCH OPEN?
NO
YES
YES
MOVE CARRIER LEFT. DOES LEFT END SWITCH CLOSE?
NO
YES
MOVE CARRIER .100" FURTHER LEFT
ROTATE ELEMENT MOTOR. DOES LEFT END SWITCH OPEN ON HOME PHASES?
NO
YES
MOVE CARRIER .250" RIGHT TO SPACE 0
IS "E" KEYBUTTON DEPRESSED?
YES
ENERGIZE ELEMENT MOTOR SERVICE FUNCTION
NO
MOVE CARRIER TO LEFT MARGIN AND ENERGIZE CARRIER MOTOR HOLD
TRANSFER CONTROL TO Z80 AND BEGIN FUNCTIONAL SCANNING
INITIALIZATION COMPLETE

INITIALIZATION SEQUENCE

The sequence of events which occur during initialization is described below. Understanding this process enables the technician to compare what does happen with what should happen, which can often lead to quick diagnosis of a problem.

1. When the Power Switch is turned on, the Motor Controller (8053) initializes, and it Resets the Memory Controller (Z80). Also, the Watchdog Circuit begins to monitor the Motors and Solenoids.

2. At this point the initialization process is divided between the Motor Controller (8053) and the Memory Controller (Z80).

3. The Motor Controller (8053) performs the following sequences:

   A) The 8053 checks ZHS and Z Data line levels. If these are not okay, initialization starts over.

   B) The 8053 sends Software Version Level to the Z80.

   C) The Motor Controller checks if the Return or Return/P Keybuttons are depressed, and if so, the 8053 sends the Code to the Z80.

   D) The Ribbon Solenoid momentarily energizes to insure the Ribbon Mechanism is reset.

   E) The Carrier moves .400" to the right to assure that the Element Home Positioner is not holding the Left End Switch closed, and then moves .100" to the left.

   F) The Electronics applies holding current to the Carrier Motor phases to stabilize the Carrier Motor Shaft.

   G) The Element Motor Shaft rotates quickly to snap the Element onto the Drive Disc (a maximum of 2 1/2 revolutions).

   H) The Index Motor Shaft rotates for 1/2 forward linespace and then 1/2 reverse linespace to make sure the Drive Gears, Pinion, and Platen Gear are seated properly.

   I) The Electronics checks if the Left End Switch is open. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

   J) The Carrier moves left for a maximum of four seconds to check the closing of the Left End Switch. If the Left End Switch never closes, the Initialization Sequence repeats itself every four seconds until the switch is closed or power is turned off.

   K) The Carrier moves .100" to 1.00" to the right and the Electronics checks if the Switch opens. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

   L) The Carrier moves to the left until the Left End Switch closes, and then another .100" to the left.

3. The Motor Controller (continued)

   M) The Electronics energizes the Element Motor counterclockwise for up to 2.7 revolutions. When the ear on the Element Home Positioner drops into the notch on the Rear Scissors Gear under Spring Tension, the Left End Switch opens. The Electronics stops shaft rotation and checks that the Left End Switch opened on the Element home phases. If the Left End Switch does not open, the Electronics holds the Carrier stable until the switch opens. If the Switch does not open when the proper Element Motor phases are turned on, the initialization sequence repeats until this does occur, or until power is turned off.

   N) Carrier moves approximately .250" to the right. This new location is reference position Zero.

   O) The Electronics checks to see if the "E" Keybutton is depressed for the Element Service Function. If so, the Electronics energizes the Element Motor for approximately one minute.

   P) If "E" Keybutton is not depressed, the 8053 moves the Carrier to the Left Margin and energizes the Carrier Motor hold.

   Q) The 8053 initialization is now complete.

   R) The 8053 now transfers operational control to the Z80 and begins functional scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

4. The Memory Controller Z80 performs the following sequences while the 8053 is performing its sequences:

   A) The Z80 sets up communication lines between it and the 8053; initializes the LCD Controller; sets the variables in the System RAM, and clears the LCD RAM to insure no erroneous data is present.

   B) The Z80 waits for the 8053 to send the Software Version Level.

   C) The Z80 checks to see if the Return or Return/P Code was sent from the 8053. If Return Code was sent, the Z80 instructs the 8053 to perform Self Typing. If Return and P Code was sent, the Z80 instructs the 8053 to perform the Diagnostic Tests. Z80 initialization stops at this step when doing the Self Typing or Diagnostics.

   D) If no Return Code was issued by the 8053, the Z80 sends code to tell the 8053 to move the Carrier to the Left Margin (Space 12).

   E) The LCD turns "On."

   F) The Z80 writes Test TEXT data to the "TEXT" RAM and then reads this data. If the TEXT data is correct, the next step occurs. If not, "TEXT MEMORY FAILURE" appears on the LCD, and the machine beeps five times before the next step.

   G) The Z80 sets the 10 pitch default Margins and Tab.

   H) The Dictionary initializes.

   I) The Z80 initialization is complete and the Z80 has control over all future operations except scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

5. Once 8053 and Z80 initialization are both complete, the machine initialization is complete.

TROUBLESHOOTING GUIDE FOR ELECTRICAL PROBLEMS

This Troubleshooting Guide provides probable causes for some specific machine problems. There is no intent to cover every possible thing that could go wrong. Since electrical problems may cause a machine failure during initialization, the technician should read and thoroughly understand the preceding section on the Initialization Sequence.

OBSERVE STATIC PRECAUTIONS

IMPORTANT: When working with static sensitive devices, such as the LCD and Printed Circuit Boards, be sure to observe static precautions to prevent damage to these devices.

GENERAL TROUBLESHOOTING TECHNIQUES

-- Look for the obvious (broken wires, unplugged connectors, etc.)

-- Check the problem part first, and then logically limit the possibilities through all associated wiring, connectors, and circuit boards.

-- Check mechanical functions for freeness, lubrication, and proper operation.

-- Check standard adjustments.

Diagram Reference Symbol

7B-1 Indicates appropriate diagram page number.

WATCHDOG CIRCUIT

The Watchdog Circuit is a safety circuit that monitors the length of time that the Ribbon Solenoid, Hammer Solenoid, and Carrier Motor are energized. If the above components remain energized longer than normal, the Watchdog Circuit forces the Slave Microprocessor (8053) to reset and try to reinitialize the machine.

To disable the Watchdog Circuit for troubleshooting purposes, short point "A" of Diode CR19 to ground. If not disabled, the Watchdog Circuit forces the Slave (8053) Microprocessor to continually reset.

CONTROL BOARD CONNECTIONS

When troubleshooting the PWP, it is not necessary to have the LCD and Disk Drive connected to the Control PC Board. Also, if the PWP initializes correctly without these components, but not when they are connected, a problem exists in either the LCD or Disk Drive. Likewise, Keyboard, Cursor Keypad, and Mode Switch do not have to be connected to the PC Boards either. When the Mode Switch is disconnected, the PWP defaults to the typewriter mode.

OBSERVE STATIC PRECAUTIONS

SYMPTOM: MACHINE APPEARS TOTALLY DEAD

LCD is blank, and Carrier does not move at all

Probable Causes:
1) .75 Amp Fuse (Slo-Blo)
2) Transformer
3) AC Input Receptacle
4) Power Switch
5) Power Cord
6) Control PC Board
7) ROM U11 Defective

How to Isolate Problem

A) If Fuse is not blown, check the Transformer primary circuit as follows: With machine un-plugged, detachable Cord in place, and Power Switch turned "On," use an Ohmmeter to measure resistance between the Hot and Neutral Prongs of the Power Cord. The reading should be approximately 9.9 ohms. 7B-1

If the measured resistance is correct, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section. If not, check the Power Cord, Fuse, AC Input Receptacle, and Power Switch: Replace defective parts. If these parts are good, replace the Transformer.

If the Fuse was blown, isolate the fault as follows:

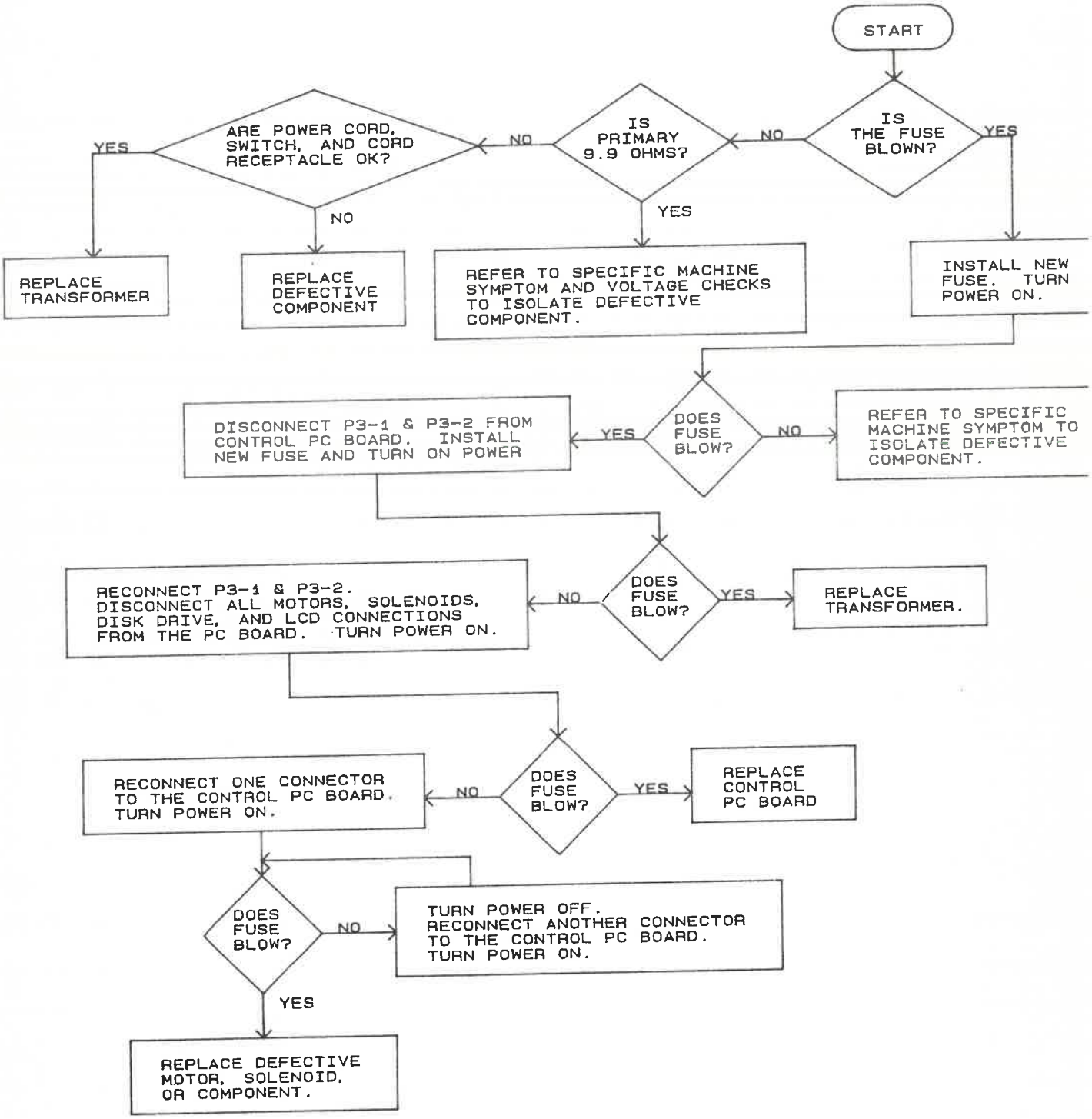
1. Install a new fuse and turn power on. If the fuse does not blow right away when power is turned on, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section to determine which component may have caused the fuse to blow.

2. If the fuse did blow in Step A-1, turn power off and disconnect Transformer Connectors P3-1 & P3-2 from the Control PC Board. Install a new fuse, and turn power on. If the fuse blows, there's a short in the Transformer circuit. Replace Transformer.

3. If the fuse did not blow in Step A-2, turn power off. Plug Transformer Connectors P3-1 & P3-2 back into the Control PC Board, disconnect all Motor, Solenoid, Disk Drive, and LCD Connectors from the Control PC Board, and turn power on. If the fuse blows, there's a short on the Control PC Board. Replace Control PC Board.

   If the fuse does not blow, turn power off; reconnect one Connector to the Control PC Board. Turn power on. If the fuse blows now, there's a short in that Component. Replace defective Component. If it does not blow, use the process of elimination to determine which unplugged component (LCD, Disk Drive, Motors, or Solenoids) is shorted, and replace it.

MACHINE TOTALLY DEAD


START
IS THE FUSE BLOWN?
YES
NO
IS PRIMARY 9.9 OHMS?
NO
YES
ARE POWER CORD, SWITCH, AND CORD RECEPTACLE OK?
YES
NO
REPLACE TRANSFORMER
REPLACE DEFECTIVE COMPONENT
REFER TO SPECIFIC MACHINE SYMPTOM AND VOLTAGE CHECKS TO ISOLATE DEFECTIVE COMPONENT.
INSTALL NEW FUSE. TURN POWER ON.
DOES FUSE BLOW?
YES
NO
DISCONNECT P3-1 & P3-2 FROM CONTROL PC BOARD. INSTALL NEW FUSE AND TURN ON POWER
REFER TO SPECIFIC MACHINE SYMPTOM TO ISOLATE DEFECTIVE COMPONENT.
DOES FUSE BLOW?
NO
YES
RECONNECT P3-1 & P3-2. DISCONNECT ALL MOTORS, SOLENOIDS, DISK DRIVE, AND LCD CONNECTIONS FROM THE PC BOARD. TURN POWER ON.
REPLACE TRANSFORMER.
DOES FUSE BLOW?
NO
YES
RECONNECT ONE CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE CONTROL PC BOARD
DOES FUSE BLOW?
NO
YES
TURN POWER OFF. RECONNECT ANOTHER CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE DEFECTIVE MOTOR, SOLENOID, OR COMPONENT.

SYMPTOM: MACHINE FAILS TO COMPLETE INITIALIZATION OR REPEATS INITIALIZATION

When checking initialization, move Carrier to the center of the machine, and turn Power Switch on. Use the following guide to determine the cause of the failure. Refer to the Wiring Diagram. 7B-1

SYMPTOM	PROBABLE CAUSE
Element Motor rotates, Carrier does not move, LCD is dark, Platen wiggles approximately every 3 seconds. Contrast control operates normally.	1) Carrier Motor Connector disconnected. 2) Control PC Board--Carrier Motor Circuit bad.
Element Motor doesn't rotate. Machine tries to initialize and repeats this until power is turned off.	1) Element Motor Connector disconnected 2) Control PC Board--Element Motor Circuit bad.
Carrier vibrates against Left Side Frame, then tries to reinitialize approximately every 4 seconds.	1) Left End Switch or switch connection is always open. 2) Control PC Board--Left End Switch Circuit bad.
Carrier moves right about .4"; Element rotates; Carrier moves right again about .8" and stays there. LCD is dark blue. Contrast control works.	1) Left End Switch is always closed. 2) Control PC Board--Left End Switch Circuit bad.
Platen wiggles, Carrier moves right approximately .4", Element rotates, Carrier chatters, pauses, Carrier repeatedly chatters approximately every 4 seconds. LCD is dark. Contrast control works.	1) Carrier Motor Phase is open. 2) Control PC Board--Carrier Phase Circuit bad.
Machine initializes up to the point that the Copyright Message is displayed on LCD.	1) ROM U18 is defective. 2) Defective Control PC Board.
Machine does not initialize, but LCD is dark blue and EL Panel is lit.	1) ROM U11 and U18 are in wrong sockets (reversed). 2) Defective Control PC Board.
Machine does not initialize, LCD is blank, EL Panel is not lit, all Power Supply voltages are very low.	1) Transformer secondary connectors are on the wrong post header of Control PC Board. 2) Transformer is defective.
Element Motor noisy and sluggish during initialization. Strobing occurs during printing.	1) Element Motor Phase is open. 2) Control PC Board--Element Phase Circuit is bad.

LCD & EL PANEL PROBLEMS 7B-1

SYMPTOM	PROBABLE CAUSE
LCD is dark blue and no contrast control. EL Panel is lit.	1) No -13 VDC to LCD--Open -13V line in LCD Cable. 2) Defective LCD or Control PC Board.
Image on right half of LCD is clear. Image also shows on left half, but is distorted. EL Panel is lit.	1) D1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Image on left half of LCD is clear. Image also shows on right half, but is distorted.	1) D2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is blank; EL Panel is lit; and no contrast control.	1) FLM Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is completely blank; no contrast control.	1) LCD Cable Connector is reversed on on Control PC Board or LCD.
Slight loss of contrast on LCD. EL Panel is lit.	1) MB Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue, no contrast. EL Panel is lit.	1) CL1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue with vertical lines, Contrast control works. EL Panel is lit.	1) CL2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD flickers various block patterns and poor contrast control. EL Panel is lit.	1) +5 VDC Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Very narrow range or no contrast control. EL Panel is lit. Image is normal.	1) Defective Contrast Potentiometer on LCD. 2) Defective LCD.
LCD is dark, but Characters on LCD are okay, EL Panel does not light. Contrast control works.	1) No 120 VAC output from DC/AC Inverter. 2) Defective EL Panel. 3) 18 V line on LCD Cable open. 4) Defective Control PC Board. 5) Ground Line on LCD Cable open. 6) Defective EL Panel Pico Fuse F1.

DISK DRIVE PROBLEMS 7B-1

SYMPTOM	PROBABLE CAUSE
LCD indicates "Disk Not Loaded" when options 4-7 are selected, but a Disk is in the Disk Drive.	1) Disk Drive Cable Connector is reversed on Control PC Board or Disk Drive.
Disk Drive runs continuously when a Disk Function is selected. Unable to get the Directory.	1) Ready Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
LCD indicates "Disk Not Loaded" when Disk is loaded in the Disk Drive.	1) $\overline{\text{Media}}$ Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" occurs during any Disk Drive function.	1) WRGA Line on Disk Drive Cable open. 2) RDDT Line on Disk Drive Cable open. 3) Defective Disk Drive or Control PC Board.
Occasional "Disk Read Error" occurs during Disk Drive function.	1) $\overline{\text{DRESET}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" and Disk in Disk Drive is erased.	1) $\overline{\text{WRDT}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
Disk Drive Motor does not function and PWP Menu options 4-8 fail to operate.	1) $\overline{\text{MTON}}$ Line on Disk Drive Cable open. 2) No +6.5 volts to Disk Drive. 3) Defective Disk Drive or Control PC Board.
"Disk Write Protected" error when Disk in Drive is not "Write Protected."	1) $\overline{\text{WRPR}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
PWP initializes, but no Disk Drive functions operate.	1) No +5 volts to Disk Drive. 2) Defective Disk Drive or Control PC Board.

MISCELLANEOUS 7B-1

SYMPTOM	PROBABLE CAUSE
Machine completes initialization; Typewriter Mode is normal, but Word Processing Mode cannot be selected.	1) Mode Selector Switch. 2) Defective Control PC Board.
Prints wrong characters or strobes (Hammer strikes between Print Element Petals).	1) Defective or incorrectly adjusted Left End Switch (Adj. #1). 2) Incorrect Element Motor Position (Adj. #2). 3) Incorrect Hammer Center Position (Adj. #3). 4) Broken Disc on Element Drive Shaft or binding Element Drive Shaft. 5) Linefinder or Ribbon Guide interferes with Print Element. 6) Improper Element Scissors Gear tension. 7) Inside Scissors Gear slips on Element Drive Shaft. 8) Defective Element Motor. 9) Defective Control PC Board.
Index Motor vibrates noisily and fails to linespace.	1) Open or shorted windings in Index Motor. 2) Defective Control PC Board.
Hammer or Ribbon Drive Solenoid fails to fire.	1) Defective Solenoid. 2) Defective Control PC Board.
Beeper fails to beep.	1) Defective Beeper. 2) Defective Control PC Board
Left Margin changes.	1) Felt Wipers on Carrier Rear Rail require lubrication. 2) Mechanical interference with Carrier movement. 3) Defective Control PC Board.
Poor vertical correction registration.	1) Linefinder binding on Platen. 2) Paper Feed Rollers binding. 3) Platen binding.
Correction Ribbon too slack (blouses).	1) Defective Brake Spring. 2) Defective Helper Spring on Brake Spring.
Correction Ribbon lifts during normal printing	1) +36 VDC on +18 VDC line from DC Power Supply of Control PC Board (Check Q13 on PC Board).

OBSERVE STATIC PRECAUTIONS

RESISTANCE AND VOLTAGE CHECKS

Use the following Resistance and Voltage Check Charts when troubleshooting problems with electrical components. With Volt/Ohmmeter probes on specified pins of the connector, the resistance or voltage readings should read approximately at the values given in the charts. NOTE: Readings may vary between Volt/Ohmmeters. Refer to the Wiring Diagrams in the Diagrams Section for connector and pin locations.

RESISTANCE CHECKS

All Resistance Checks must be made with the Power OFF and the appropriate connector unplugged from the Control PC Board.

Refer to page 7B-1 to identify connectors.

COMPONENT	CONNECTOR	PIN NUMBERS	APPROXIMATE RESISTANCE
Element Motor	P-ELE		
COM and A		3 & 1 or 4 & 1	24 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	24 ohms ± 7%
A and A'		1 & 2	48 ohms ± 7%
COM and B		3 & 6 or 4 & 6	24 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	24 ohms ± 7%
B and B'		5 & 6	48 ohms ± 7%
Carrier Motor	P-CAR		
COM and A		3 & 1 or 4 & 1	50 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	50 ohms ± 7%
A and A'		1 & 2	100 ohms ± 7%
COM and B		3 & 6 or 4 & 6	50 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	50 ohms ± 7%
B and B'		5 & 6	100 ohms ± 7%
Index Motor	P-IND		
COM and A		3 & 1 or 4 & 1	50 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	50 ohms ± 7%
A and A'		1 & 2	100 ohms ± 7%
COM and B		3 & 6 or 4 & 6	50 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	50 ohms ± 7%
B and B'		5 & 6	100 ohms ± 7%
Ribbon Solenoid	P-RSOL	1 & 2	9.60 ohms ± 1 ohm
Hammer Solenoid	P-HSOL	1 & 2	1.98 ohms ± .2 ohm
Left End Switch	P-LES	1 & 2	0 Ohms when closed; Infinite (∞) ohms when open
Transformer Primary	AC Plug (Switch must be turned on)	Prongs	Approximately 10 ohms
Transformer Secondaries	P3-1 (Blue Wires)	1 & 2	Approximately 10 ohms
	P3-2 (Red Wires)	1 & 2	Less than 1 ohm

CAUTION: Whenever performing checks with power on, take care not to short two points together with the Voltmeter probes. Damage will occur to the Power Supply Circuits.

DC VOLTAGE CHECKS

All DC Voltage checks must be made with Connectors in place and Power On. Set Voltmeter for DC Volts and appropriate voltage range. With Power Off, attach common probe of Voltmeter to Power Supply Ground Reference Point 7C-1, and touch the other probe to the Check Point listed in the Chart. Turn Power On, allow machine to initialize, and take readings (Idle State). Refer to the appropriate Diagrams Section for Connector locations. 7B-1 7C-1

COMPONENT	CHECK POINT	LOCATION	APPROX. DC VOLTAGE
CONTROL PC BOARD: 7C-1			
RIBBON SOLENOID	P-RSOL	PINS 1-2	+18 VDC
HAMMER SOLENOID	P-HSOL	PINS 1-2	+18 VDC
ELEMENT MOTOR	P-ELE	PINS 1-6	+18 VDC
INDEX MOTOR	P-IND	PINS 1-6	+18 VDC
CARRIER MOTOR	P-CAR	PINS 1-6	+.7 or +4.2 VDC
NOTE: Voltage reading depends upon location of the Carrier Rotor during holding current.			
+5 VDC	5 VOLT TEST POINT	(W2)	+4.75 TO 5.25 VDC
+6.5 VDC	6.5 VOLT TEST POINT	(W3)	+6.07 TO 6.92 VDC
+18 VDC	18 VOLT TEST POINT	(W4)	+16.83 TO 19.17 VDC
-13 VDC	-13 VOLT TEST POINT	(W1)	-12.5 TO -13.5 VDC
LE/LID SWITCH (W/SWITCH OPEN)	P-LES	PIN 1 PIN 2	0.0 VDC +4.9 VDC
LE/LID SWITCH (W/SWITCH CLOSED)	P-LES	PIN 1 PIN 2	0.0 VDC 0.0 VDC
TW/WP MODE SWITCH (TW POSITION)	P-MODE	PIN 1 PIN 2	+4.9 VDC 0.0 VDC
TW/WP MODE SWITCH (WP POSITION)	P-MODE	PIN 1 PIN 2	0.0 VDC 0.0 VDC
LCD CONNECTOR			
+5 VDC	P-LCD	PIN 6	+4.75 TO 5.25 VDC
-13 VDC	P-LCD	PIN 4	-12.5 TO -13.5 VDC
+18 VDC	P-LCD	PIN 2	+16.83 TO 19.17 VDC
DISK DRIVE CONNECTOR			
+5 VDC	P-DISK	PIN 11	+4.75 TO 5.25 VDC
+6.5 VDC	P-DISK	PIN 2	+6.07 TO 6.92 VDC
BRIDGE RECTIFIER DC OUTPUT			
+36 VDC	C17	LEFT SIDE	APPROX. 36 VDC

AC VOLTAGE CHECKS

Make AC Voltage checks with Connectors in place and power on. Set Voltmeter for AC Volts and appropriate voltage range. Touch probes to points listed below. 7B-1 7C-1

CHECK	CHECK POINTS	APPROX. VOLTAGE
TRANSFORMER INPUT	CHECK LINE VOLTAGE AT POWER OUTLET	LINE VOLTAGE (117 VAC) ± 10%
TRANSFORMER OUTPUTS	P3-1, PINS 1 & 2 (BLUE WIRES)	17 TO 23 VAC
	P3-2, PINS 1 & 2 (RED WIRES)	25.5 TO 38.5 VAC
DC/AC VOLTAGE INVERTER OUTPUT	INVERTER OUTPUT PINS	120 VAC (APPROX.)

KEYBOARD SERVICE DIAGNOSTICS AT POWER UP

Several Keybuttons activate service functions and diagnostics when they are depressed and held down during initialization. To activate any of these functions, depress and hold down the Keybutton until after the Element homes during initialization. Jackets should be in place and deck closed. Release the Keybutton when the Service Function begins. NOTE: Mode Switch can be in either Word Processor or Type Mode.

OBSERVE STATIC PRECAUTIONS

If the Keyboard is disconnected from the machine, Service Functions can be entered by shorting the appropriate Keyswitch Row and Column pins on Keyboard Connector J1. Remove the jumper after the Service Function begins. Refer to the appropriate Keyboard Layout Chart and Matrix Diagram to determine which Row and Column should be shorted to perform the Service Function. 7A-2 7A-3

KEYBUTTON	FUNCTION
RETURN	Initiates Self Typing, checks LCD function, and displays the part numbers of the Motor Control, Memory Control, and Dictionary Software installed on the Control PC Board. When this function starts, the LCD turns completely dark. The machine prints out a line of characters, corrects some in the middle line, and then performs a linespace and carrier return. On the second line, the LCD turns completely light, and the machine repeats the Self Typing and correcting it did on the first line. On the third line, the LCD background remains light, and the Motor Control, Memory Control, and Dictionary Software part numbers are displayed in the center of the LCD. Self Typing continues as on previous lines. On the fourth line, a dark border is added to the previous display on the LCD, and Self Typing continues. After the fourth line, the display turns dark, and the cycle repeats until power is turned off.
"E"	Carrier stops at Space 0 and the Electronics energizes Element Motor phases EB and EA' for one minute to make adjustments. After one minute, the Carrier moves to the Left Preset Margin and the machine enters the Typewriter or Word Processor Mode, depending on Mode Switch selection.
RETURN & P	Initiates a series of Diagnostic Tests that are performed by the electronics of the typewriter. These tests include: 1) Keyboard & Keypad Test, TW/WP Switch Test 2) CRC Generator Test 3) RAM Test 4) ROM Test 5) Disk Drive Test 6) Self Typing

A description of each test and error messages are on the following pages.

1) KEYBOARD, KEYPAD, AND TW/WP MODE SWITCH TEST

With the Return and P Keybuttons depressed and power turned on, the machine initializes and a graphic display of all the Keybuttons of the Keyboard and Keypad, plus TW & WP for the Mode Switch, appear on the LCD.

When each Keybutton is depressed, the corresponding character disappears from the LCD because the electrical circuit for that character is completed. If the character remains on the LCD, the Keyswitch did not close the circuit, and the cause should be determined (i.e. Bad Flexible Circuit, Molded Dome Switch, etc.).

After all Keybuttons disappear from the LCD, move the TW/WP Mode Switch three times to delete TW and WP from the LCD and initiate the next test (CRC Generator). If all Keybuttons are not deleted from the LCD prior to moving the TW/WP Mode Switch, the LCD indicates a "KEYBOARD FAILURE" and stops further testing.

If the Keyboard/Keypad Test is not required, simply move the TW/WP Mode Switch three times, and depress the "S" Keybutton to skip the Keyboard Test. NOTE: To skip any other test after the Keyboard Test, just depress the "S" Keybutton and the next test automatically begins.

2) CRC GENERATOR TEST

This test checks the CRC Generator in the ASIC chip. If the Generator is defective "CRC GEN. FAILURE" appears on the LCD and no further test can be performed. If the Generator is okay, the next test automatically begins.

3) RAM TEST

The RAM Test performs a check on RAM Bank 1 and RAM Bank 2. If RAM is okay, the next test automatically begins. If a "RAM FAILURE" is detected, the following is displayed on the LCD:

RAM FAILURE AAAA:XXYY

Explanation: RAM Chips U8 and U9 are defective. The test does not determine which one; replace both. AAAA is the address in RAM that failed. XX is the expected data, and YY is the data found.

4) ROM TEST

The ROM Test performs a check on Program ROM 0, Program ROM 1, and Dictionary ROM 2. If all ROM's are okay, the next test automatically begins. If a ROM fails, the following is displayed on the LCD:

ROM FAILURE IJ AAAAA:XXYY

Explanation: There are three ROM Chips on the Control PC Board. The test determines the defective ROM by displaying the U number (i.e. 10 represents U10) in the position indicated by IJ on the LCD. AAAAA is the address in ROM where the data is stored. XXYY is the data that should be in ROM. Replace the defective ROM.

5) DISK DRIVE TEST

WARNING - The Disk Drive Test removes all data on Disk being tested. Any files on a Disk used for the Disk Drive Test will be lost. Also, the Disk Drive Test leaves the Directory on the Test Disk blank.

A) The first check determines if a prepared Disk is inserted in the Disk Drive. If one is not inserted, "DISK NOT READY" appears on the LCD. Insert a prepared Disk in the Disk Drive and press Return.

B) Next, the electronics determines if the Disk is Write Protected. If the Disk is, the LCD displays "DISK WRITE PROTECT." Write enable the Disk or insert a different Disk, and then press the Return Keybutton.

C) In the next checks the electronics writes a test pattern, reads the test pattern, and checks the data read from the Disk for accuracy. This sequence is performed twice for a total of six operations. If Disk Drive test is okay, the last test, Self Typing, begins automatically. If an error occurs during the test in Step C, the following is displayed on the LCD:

DISK FAILURE IJ AAAA:XXYY

Explanation: There are many possible error messages that could appear on the LCD. IJ is the Code Field which indicates the detected failure. NOTE: When I is 1, J is not used; therefore, J is represented by 0 (Zero). Also, when I is 1, IJ is followed by AAAA:XXYY. AAAA is the address in RAM Memory that failed. XX is the expected data and YY is the data found. The most probable cause of the Data Compare Error (when IJ is 10) is the Disk Controller (U6 on Control PC Board) cannot write to a Disk.

The IJ Code Field errors are listed below. First determine the I value followed by the J value. For example, if the IJ error displayed was 63, that means there was a failure during a Directory Write because the "Sync" in ID Field could not be found.

```
I -- 1 DATA COMPARE ERROR
     2 FAILURE DURING DISK WRITE
     3 FAILURE DURING DISK READ
     6 FAILURE DURING DIRECTORY WRITE
     7 FAILURE DURING DIRECTORY READ
J -- 0 DISK NOT READY AFTER INITIAL CHECK PASSED
     1 DISK WRITE PROTECT AFTER THE INITIAL CHECK PASSED
     2 NOT USED
     3 "SYNC" IN ID FIELD NOT FOUND (I.E. HAVING
       TROUBLE READING DISK)
     4 DATA MARK IN ID FIELD (I.E. HAVING
       TROUBLE READING DISK)
     5 BAD CRC ON ID FIELD (I.E. DEFECTIVE DISK)
     6 SECTOR NOT FOUND (I.E. DISK NOT PREPARED,
       DEFECTIVE DISK)
     7 DATA SYNC NOT FOUND (I.E. DISK  NOT PREPARED,
       DEFECTIVE DISK)
     8 DATA "DATA MARK" NOT FOUND
     9 DATA CRC IS BAD
```

NOTE: The examples listed above are a few of the most probable faults that could occur. Use the substitution method to isolate the fault to the Disk, Control PC Board, Disk Drive, or Disk Drive Cable.

6) SELF TYPING

After successful completion of the Disk Drive Test, the LCD turns dark and the Carrier starts the Self Typing sequence that is identical to depressing the "Return" Keybutton on power up. This test continues until the machine power is turned off.

KEYBOARD AND CURSOR KEYPAD TROUBLESHOOTING PROCEDURE

NOTE: Refer to the appropriate Keyboard Switch Layout and Matrix Charts. [7A-2] [7A-3] [7A-4]

1. Identify the Matrix Position Number(s) for the Key(s) from the Keyboard Switch Layout Chart (On Models 5DEA or 5DCA, the character "5" is matrix position S6).

2. Identify the Column and Row for that position from the Keyboard Matrix Chart. Then determine Keyboard Connector Pin numbers that correspond with the column and row of the suspect key (i.e. position S6 is tied to Column C5 and Row R0, which correspond to Pins 3 & 14 of the Keyboard Connector).

3. Determine whether the problem is with the Keyboard or Control PC Board as follows:

   A) Remove the Keyboard from the machine under test. Power up the machine to initialize it. Set Mode Switch to Typewriter Mode if Switch is plugged into Control PC Board.

   To check operation of any individual character, simply short the appropriate pins on the Control PC Board Connector J1 to see if that particular character types. For example, if checking the character "5," touch a Jumper Wire between Pins 3 & 14 of Connector J1. This allows the typewriter to type the character "5" and repeat it until the Jumper Wire is removed. If the character fails to type, the problem is in the Control PC Board and replacement is necessary.

   B) If character does type, then there is a Keyboard fault.

4. Diagnose a Keyboard fault as follows:

   A) Touch the one lead of an ohmmeter to the pin on the Keyboard Connector that corresponds with the appropriate Column. Then touch the other lead to the pin on the Keyboard Connector that corresponds with the appropriate Row [i.e. for position S6 touch one lead to Connector P1, Pin 3, (Column C5) and the other lead to Connector P1, Pin 14 (Row R0)].

   NOTE: Since there are no Diodes used with this Keyboard, it makes no difference which ohmmeter lead is touched to the Matrix Column and which one is touched to the Matrix Row.

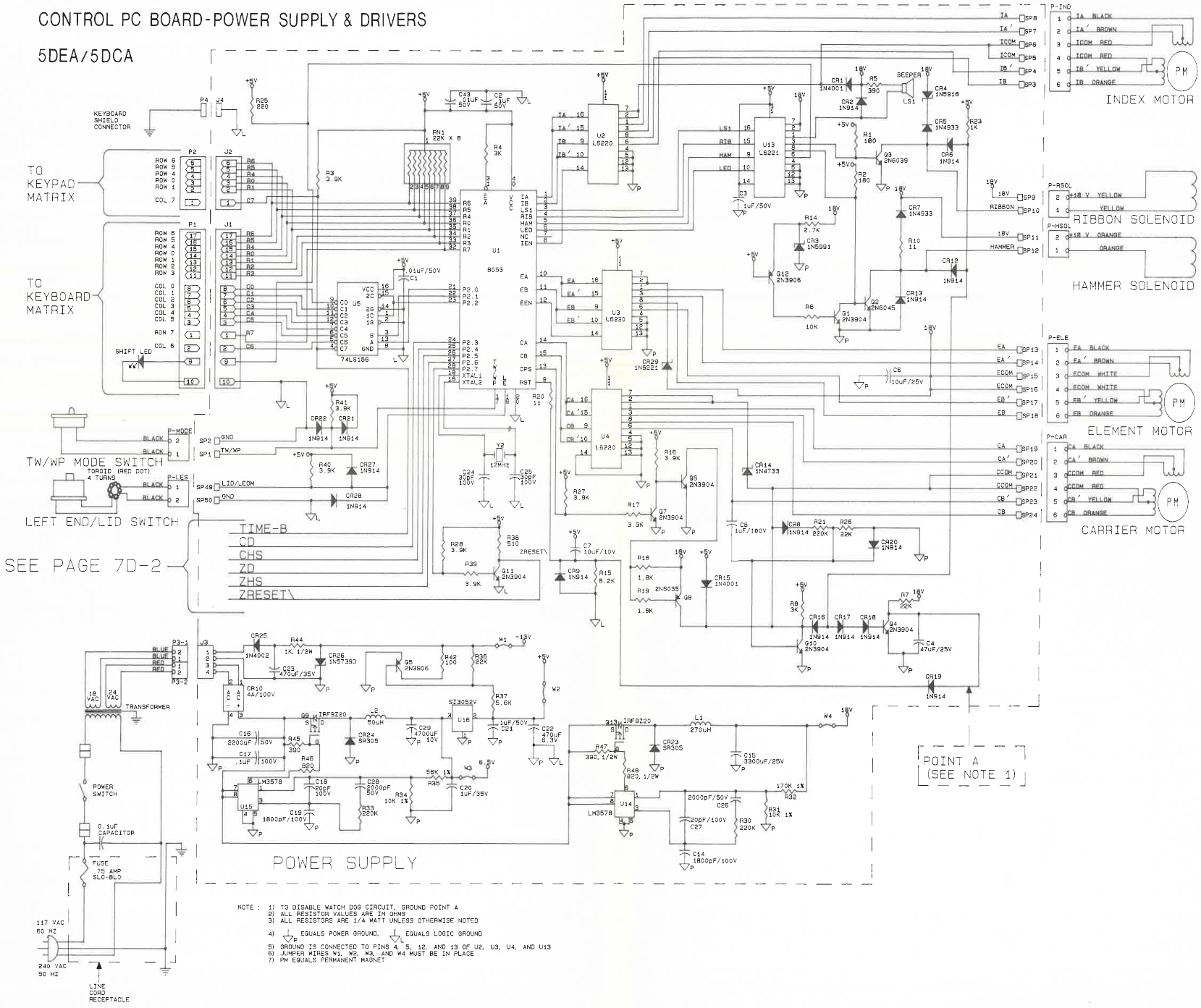
   B) Depress the Key being checked. If the switch is good, the ohmmeter should indicate less than 1000 ohms resistance. (Readings vary with different meters. To know what the meter should read, take a similar reading on a known good Key Switch in the Keyboard Circuit). If meter indicates an open, replace the Molded Dome Switches.

   C) If there are a definite 7 or 8 characters or functions that do not operate, check to see if those 7 or 8 characters or functions are in the same Column or Row in the Keyboard Matrix. If they are, check all switches in that Column or Row through the Keyboard Connector. If they are bad, replace the Keyboard Flexible Circuit.

SCHEMATIC DIAGRAM

CONTROL PC BOARD-POWER SUPPLY & DRIVERS

5DEA/5DCA

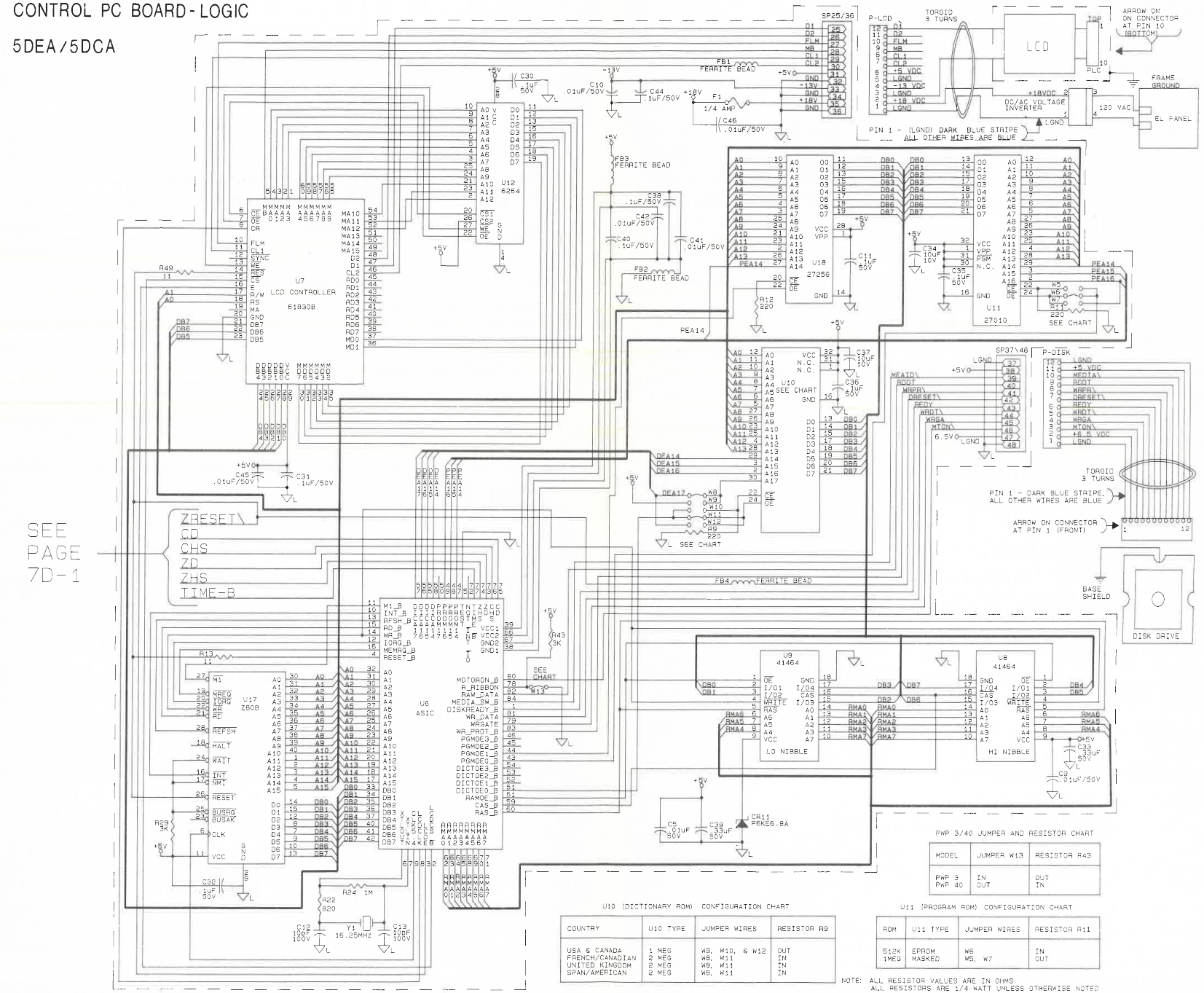


NOTE :
1) TO DISABLE WATCH DOG CIRCUIT, GROUND POINT A
2) ALL RESISTOR VALUES ARE IN OHMS
3) ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE NOTED
4) ⏚P EQUALS POWER GROUND, ⏚L EQUALS LOGIC GROUND
5) GROUND IS CONNECTED TO PINS 4, 5, 12, AND 13 OF U2, U3, U4, AND U13
6) JUMPER WIRES W1, W2, W3, AND W4 MUST BE IN PLACE
7) PM EQUALS PERMANENT MAGNET

SCHEMATIC DIAGRAM

CONTROL PC BOARD - LOGIC

5DEA/5DCA



PWP 3/40 JUMPER AND RESISTOR CHART

MODEL	JUMPER W13	RESISTOR R43
PWP 3 PWP 40	IN OUT	OUT IN

U10 (DICTIONARY ROM) CONFIGURATION CHART

COUNTRY	U10 TYPE	JUMPER WIRES	RESISTOR R9
USA & CANADA FRENCH/CANADIAN UNITED KINGDOM SPAN/AMERICAN	1 MEG 2 MEG 2 MEG 2 MEG	W9, W10, & W12 W8, W11 W8, W11 W8, W11	OUT IN IN IN

U11 (PROGRAM ROM) CONFIGURATION CHART

ROM	U11 TYPE	JUMPER WIRES	RESISTOR R11
512K 1MEG	EPROM MASKED	W8 W5, W7	IN OUT

NOTE: ALL RESISTOR VALUES ARE IN OHMS
ALL RESISTORS ARE 1/4 WATT UNLESS OTHERWISE NOTED

SECTION 7

DIAGRAMS

MODELS 5DEA & 5DCA

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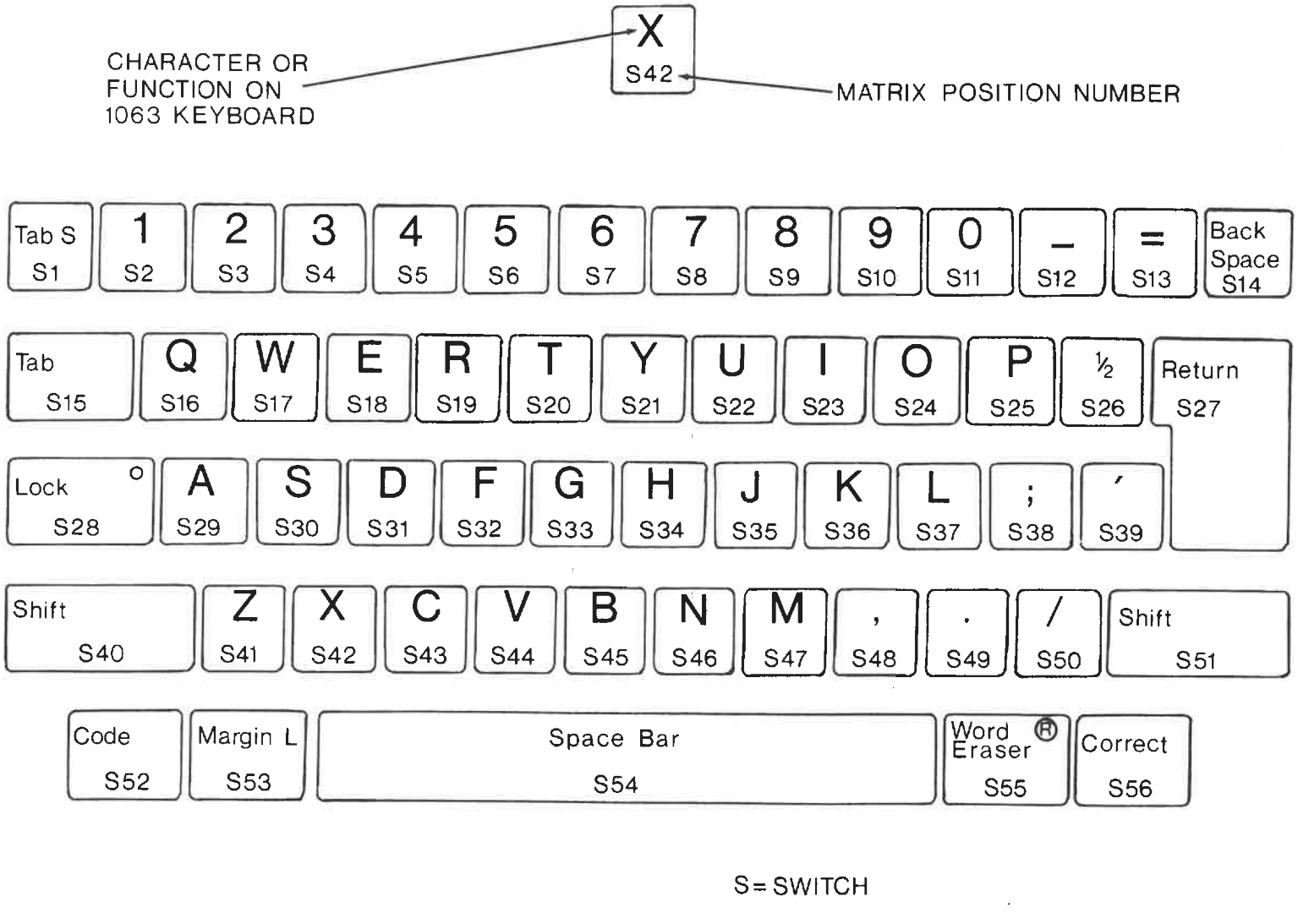
7D	SCHEMATIC DIAGRAMS	
	Control PC Board-- Power Supply, Drivers	7D-1
	Control PC Board-- Logic, RAM, ROM	7D-2

KEYBOARD LAYOUT CHART

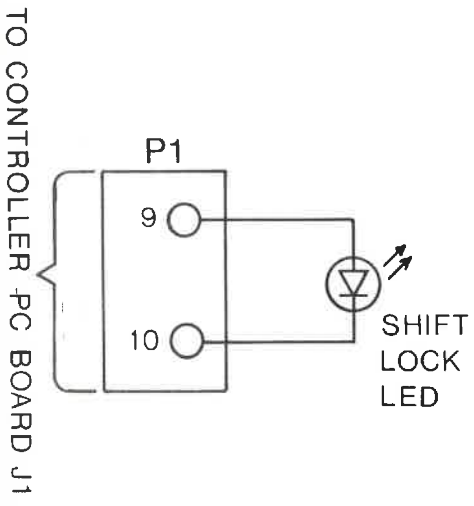
5DEA/5DCA

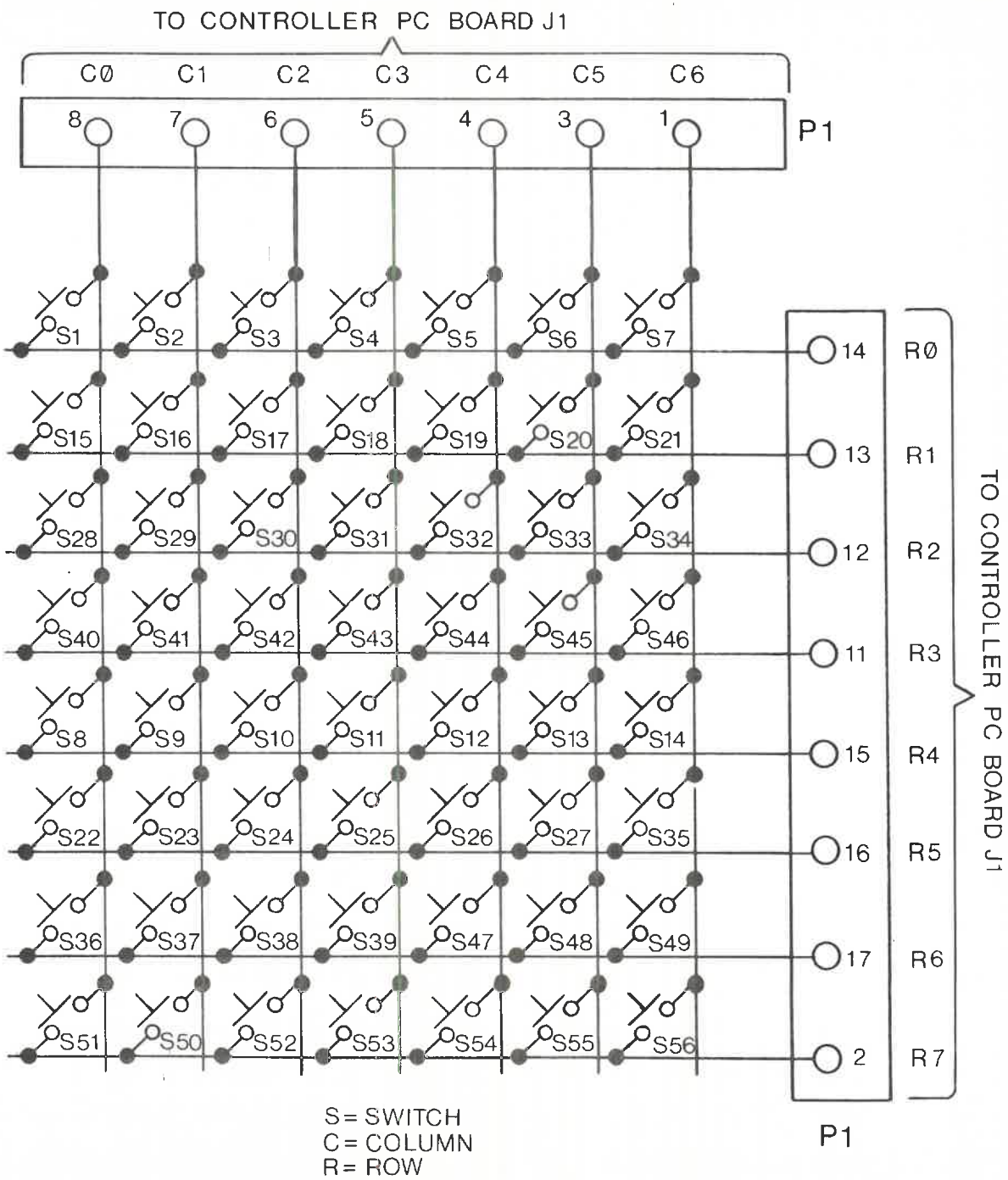


S = SWITCH

KEYBOARD MATRIX DIAGRAM

5DEA/5DCA

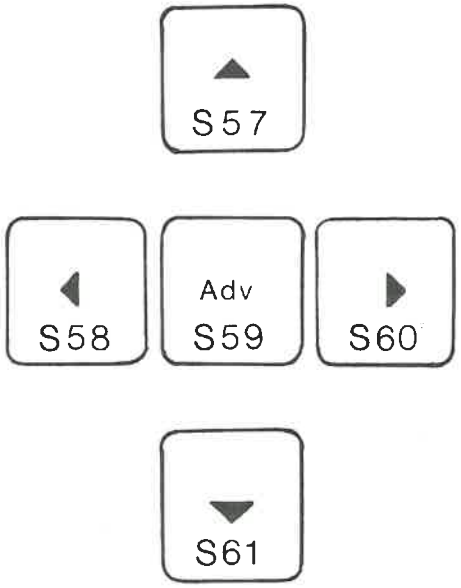


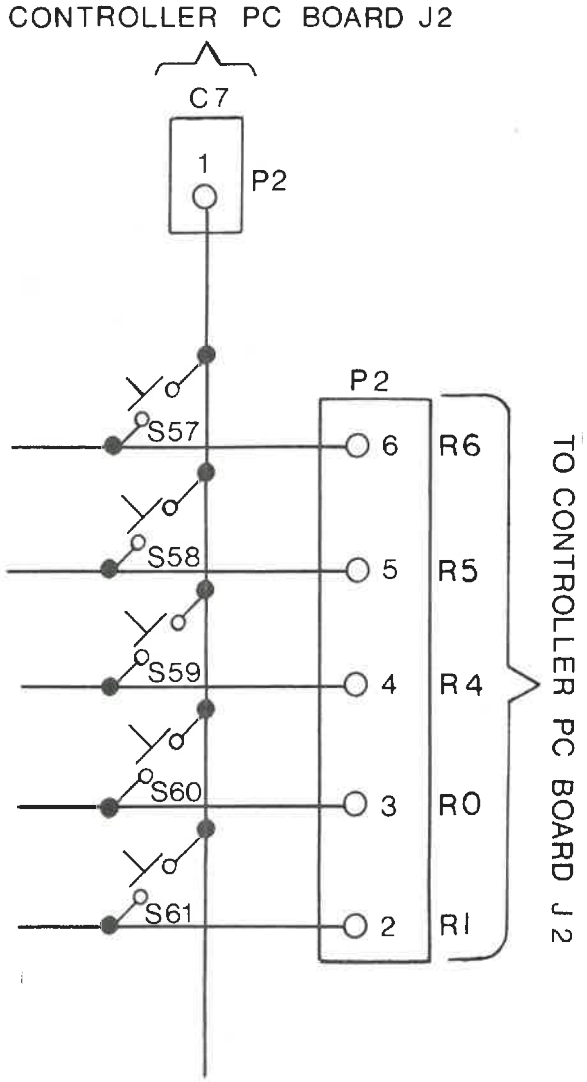


CURSOR KEYPAD

LAYOUT & MATRIX CHARTS

5DEA/5DCA

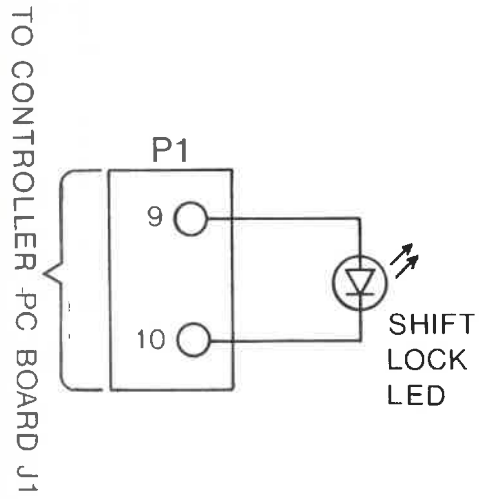


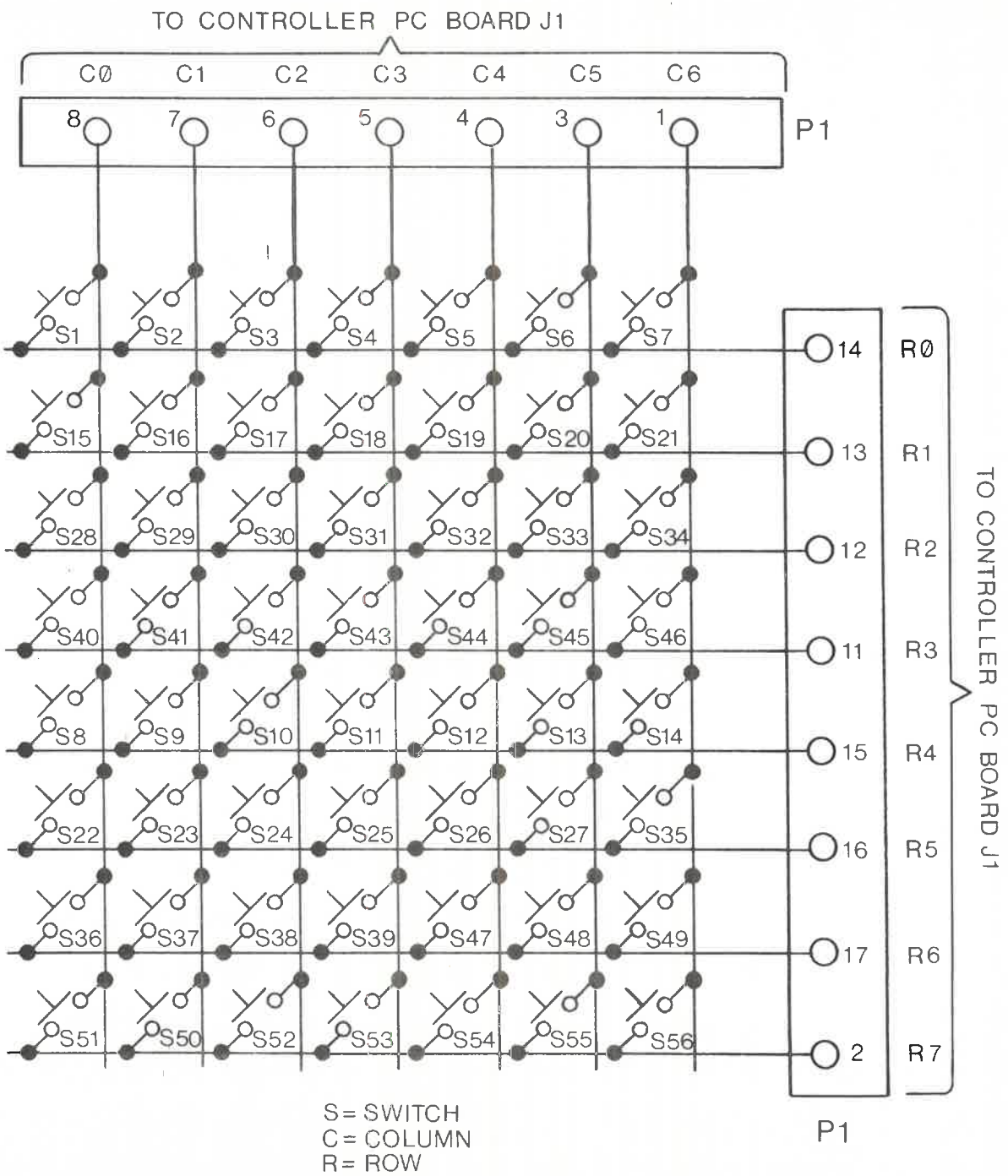


S = SWITCH
C = COLUMN
R = ROW

KEYBOARD MATRIX DIAGRAM

5DEA/5DCA



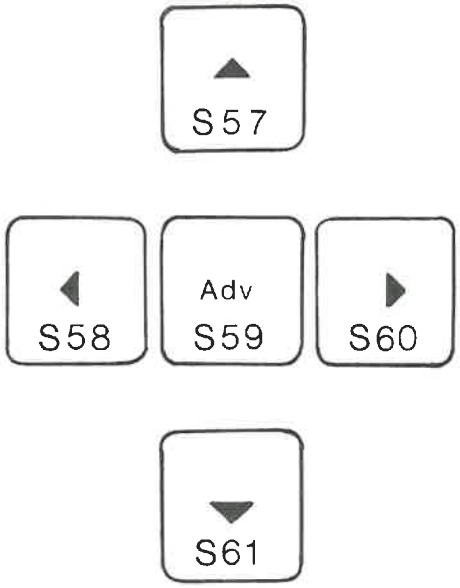


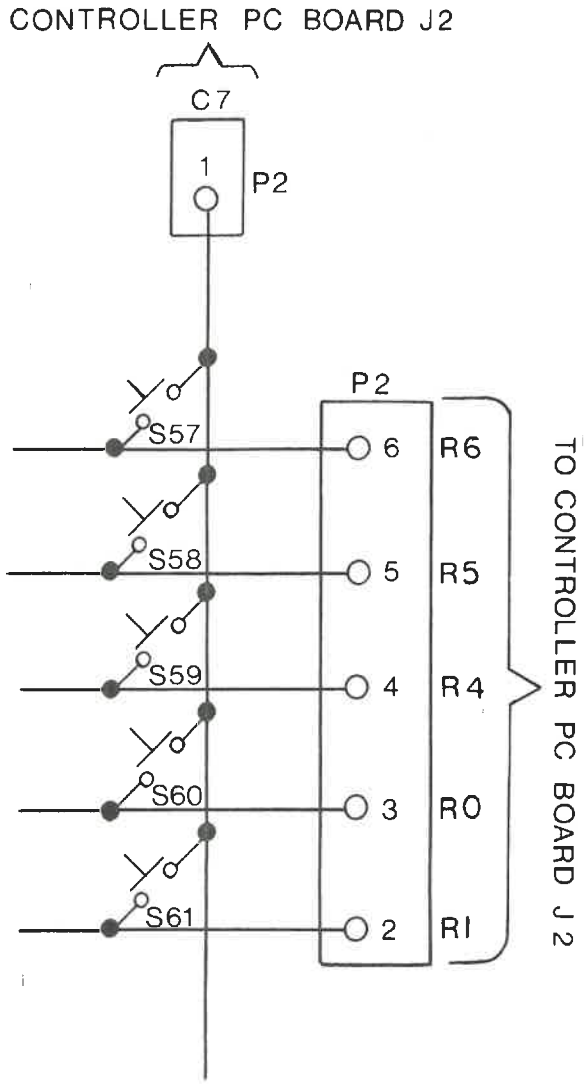
S = SWITCH
C = COLUMN
R = ROW

CURSOR KEYPAD

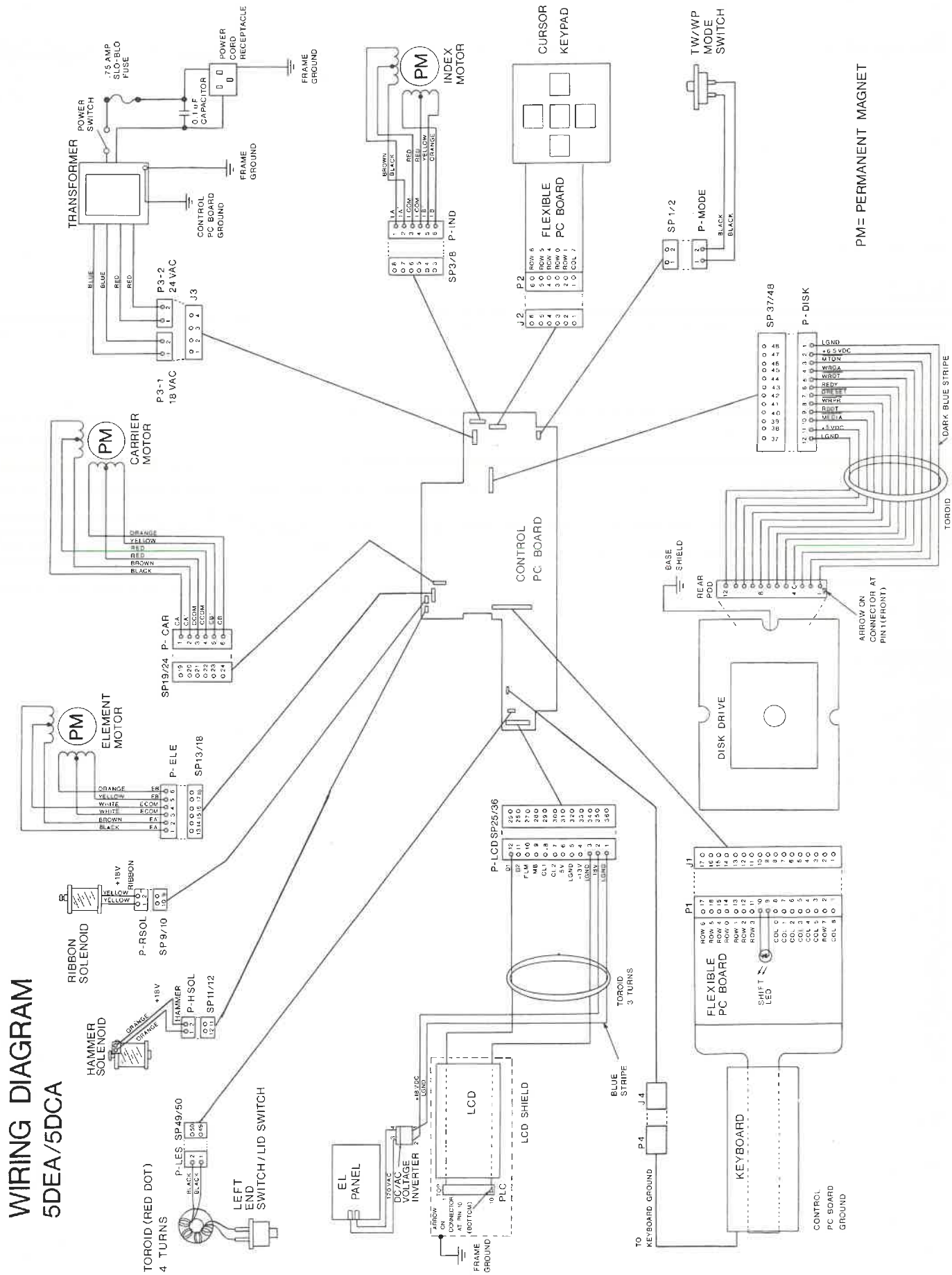
LAYOUT & MATRIX CHARTS

5DEA/5DCA





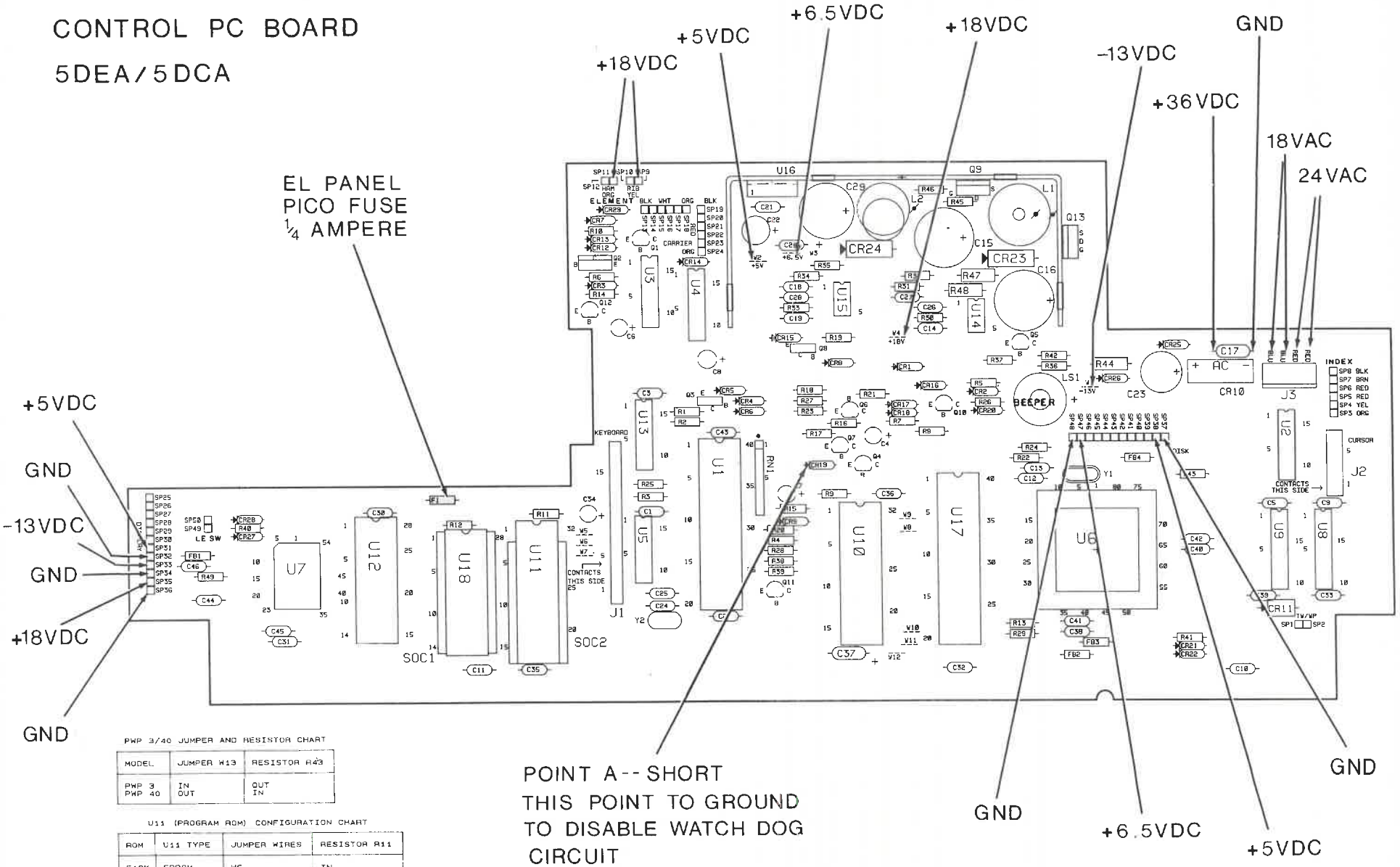
S = SWITCH
C = COLUMN
R = ROW


WIRING DIAGRAM
5DEA/5DCA
PM= PERMANENT MAGNET
TRANSFORMER
POWER SWITCH
.75 AMP SLO-BLO FUSE
0.1 µF CAPACITOR
POWER CORD RECEPTACLE
FRAME GROUND
CONTROL PC BOARD GROUND
P3-2 24 VAC
P3-1 18 VAC
J3
INDEX MOTOR
P-IND
SP3/8
CURSOR KEYPAD
FLEXIBLE PC BOARD
P2
J2
TW/WP MODE SWITCH
P-MODE
SP1/2
SP 37/48
P-DISK
CARRIER MOTOR
P-CAR
SP19/24
ELEMENT MOTOR
P-ELE
SP13/18
CONTROL PC BOARD
BASE SHIELD
REAR POD
DISK DRIVE
TOROID
DARK BLUE STRIPE
ARROW ON CONNECTOR AT PIN 1 (FRONT)
RIBBON SOLENOID
P-RSOL
SP 9/10
HAMMER SOLENOID
P-HSOL
SP11/12
P-LCD
SP25/36
TOROID 3 TURNS
BLUE STRIPE
P1
J1
FLEXIBLE PC BOARD
SHIFT LED
P4
J4
KEYBOARD
TO KEYBOARD GROUND
CONTROL PC BOARD GROUND
P-LES
SP49/50
LEFT END SWITCH/LID SWITCH
TOROID (RED DOT) 4 TURNS
EL PANEL
DC/AC VOLTAGE INVERTER
LCD
LCD SHIELD
PLC
FRAME GROUND

COMPONENT DIAGRAM

CONTROL PC BOARD

5DEA/5DCA



PWP 3/40 JUMPER AND RESISTOR CHART

MODEL	JUMPER W13	RESISTOR R43
PWP 3 PWP 40	IN OUT	OUT IN

U11 (PROGRAM ROM) CONFIGURATION CHART

ROM	U11 TYPE	JUMPER WIRES	RESISTOR R11
512K 1MEG	EPROM MASKED	W6 W5, W7	IN OUT

U10 (DICTIONARY ROM) CONFIGURATION CHART

COUNTRY	U10 TYPE	JUMPER WIRES	RESISTOR R9
USA & CANADA	1 MEG	W9, W10, & W12	OUT

DIAGRAMS 7C-

SMITH CORONA

ELECTRONIC PRODUCTS

PRINTED CIRCUIT BOARDS

COMMITMENT TO EXCELLENCE
SMITH CORONA
MADE IN U.S.A.

PC BOARD LIST

Printed in U.S.A. Form 3-0761
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PREFACE

This Manual lists all Printed Circuit Boards for Smith Corona Electronic Products. When ordering PC Boards, use only the part numbers listed in this Manual or in the appropriate Parts Manuals.

DO NOT use part numbers printed on PC Boards; they do not reflect the stage of assembly carried by Service Stores. See the Cross Reference List at the end of this Manual.

This Manual supersedes previously released Electronic Miscellaneous Bulletins #6 through #6G, and will be updated by release of a new manual (i.e. Form 3-0761-1, 3-0761-2, etc.) when new models or PC Boards are released.

This Manual covers models for the United States, Canada, United Kingdom, Australia, France, Belgium, Holland (Netherlands), Singapore, etc. The country codes listed below are used throughout the Manual.

COUNTRY CODES:

USA	= UNITED STATES	HOLL	= HOLLAND
CAN	= ENGLISH CANADIAN	SING	= SINGAPORE
UK	= UNITED KINGDOM	SP/AM	= SPANISH AMERICAN
AUST	= AUSTRALIA	FR/CAN	= FRENCH CANADIAN
		FR/BEL	= FRANCE & BELGIUM

NOTES:

1) ORDER USA/CAN BOARD PART NUMBER UNLESS FOREIGN LANGUAGE BOARD IS REQUIRED.

2) PC BOARDS LISTED UNDER ONE PART NUMBER THAT ARE JUMPER SELECTABLE FOR VARIOUS LANGUAGES, ARE SHIPPED FOR USA/CAN LANGUAGE SELECTION.

For prices refer to the current Smith Corona Parts Price List.

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ORDER USA/CAN BOARD PART NUMBER UNLESS FOREIGN LANGUAGE BOARD IS REQUIRED.

5A SERIES TYPEWRITERS

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5ACC 5AEC 5AGA 5AKC 5APC 5AWC	SL 500 XL 1500 PREMIER 100 DEVILLE 450 CXL 4200 MARK VI	CONTROL PC BOARD	772800: JUMPER SELECTABLE FOR USA/CAN, FR/CAN, SP/AM, UK, AUST, SINGAPORE, HOLL, & FR/BELGIUM
5ACD 5AED 5APD 5AWD	SL 600 XL 2500 CXL 4700 MARK XI	CONTROL PC BOARD	772091 USA/CAN 772092 UK, AUST 772093 FR/CAN 772095 SP/AM

FOR THE FOLLOWING 5A SERIES MODELS, PLEASE READ EACH BOARD DESCRIPTION BEFORE SELECTING CONTROL PC BOARD PART NUMBER.

5ACA 5AEA 5AKA 5APA 5AWA	SL 80 XL 1000 DEVILLE 80 CXL 4000 MARK V	CONTROL PC BOARD WITH ORIGINAL SOFTWARE USED ONLY ON "MADE IN USA" MACHINES. MUST BE USED WITH ELEMENT GEAR SPRING (P/N 745060). --SEE 5A SERIES BULLETIN #12	770400: JUMPER SELECTABLE FOR USA/CAN, FR/CAN, & SP/AM
		CONTROL PC BOARD WITH ANTI-STROBING SOFTWARE USED ONLY ON "MADE IN SINGAPORE" MACHINES WITH FRONT LID SWITCH, ORIGINAL KEYBOARD AND ELEMENT GEAR SPRING (P/N 771260). --SEE 5A SERIES BULLETIN #12	770414: JUMPER SELECTABLE FOR USA/CAN, FR/CAN, & SP/AM
		CONTROL PC BOARD SAME AS 770414 BUT HAS GROUND LUG FOR KEYBOARD GROUND CABLE.	771525: JUMPER SELECTABLE FOR USA/CAN, FR/CAN, SP/AM, UK, AUST, & SINGAPORE
		CONTROL PC BOARD FOR MACHINES WITH REAR LID SWITCH. CAN BE USED WITH ORIGINAL OR TYPE "B" KEYBOARDS. --SEE 5A SERIES BULLETIN #18	771535: JUMPER SELECTABLE FOR USA/CAN, FR/CAN, SP/AM, & UK

5A SERIES TYPEWRITERS (continued)

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5ACB 5AEB 5APB 5AWB	SL 105 XL 2000 CXL 4500 MARK X	CONTROL PC BOARD FOR MACHINES WITH FRONT LID SWITCH AND ORIGINAL STYLE KEYBOARD.	771155 USA/CAN 771156 FR/CAN 771158 UK
		CONTROL PC BOARD FOR MACHINES WITH REAR LID SWITCH AND ORIGINAL STYLE KEYBOARD. --SEE 5A SERVICE BULLETIN #17	771280 USA/CAN 771281 FR/CAN 771282 SP/AM 771283 UK
		CONTROL PC BOARD FOR MACHINES WITH REAR LID SWITCH AND TYPE "B" KEYBOARD. --SEE 5A SERVICE BULLETIN #20	772610 USA/CAN 772611 FR/CAN 772612 SP/AM 772613 UK

ORDER USA/CAN BOARD PART NUMBER UNLESS FOREIGN LANGUAGE BOARD IS REQUIRED.

COUNTRY CODES:

US = UNITED STATES
EC = ENGLISH CANADIAN
UK = UNITED KINGDOM
HOLL = HOLLAND
AUST = AUSTRALIA
SING = SINGAPORE
FR/CAN = FRENCH CANADIAN
SP/AM = SPANISH AMERICAN
FR/BEL = FRANCE & BELGIUM

5C SERIES PERSONAL WORD PROCESSORS

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5CCA 5CEA	PWP 5 PWP 6	CONTROLLER PC BOARD Z80 PC BOARD POWER SUPPLY PC BOARD	765330 765302 USA/CAN 765321
5CEB 5CEB (ABOVE S/N 1140000)	PWP 6 BL PWP 60	CONTROLLER PC BOARD Z80 PC BOARD Z80 PC BOARD Z80 PC BOARD POWER SUPPLY PC BOARD	765330 765302 USA/CAN 765305 UK 765306 FR/CAN 765321

5D SERIES PERSONAL WORD PROCESSORS

5DEA 5DCA	PWP 40 PWP 3	CONTROL PC BOARD	768210 USA/CAN 768212 FR/CAN 768214 SP/AM 768215 UK

PERSONAL WORD PROCESSORS (PWP)

1TCA 1TEA	SYSTEM 8 SYSTEM 12	CPU PC BOARD	760023 USA/CAN
1TEB	SYSTEM 14	CPU PC BOARD	760565 USA/CAN

ORDER USA/CAN BOARD PART NUMBER UNLESS FOREIGN LANGUAGE BOARD IS REQUIRED.

COUNTRY CODES:

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UK = UNITED KINGDOM
HOLL = HOLLAND
AUST = AUSTRALIA
SING = SINGAPORE
FR/CAN = FRENCH CANADIAN
SP/AM = SPANISH AMERICAN
FR/BEL = FRANCE & BELGIUM

5P SERIES TYPEWRITERS

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5PEF 5PCF 5PWE 5PKE	XD 5500 SD 700 MARK XVII DEVILLE 650	CONTROL PC BOARD	781960 USA/CAN 781971 FR/CAN 781972 SP/AM 781973 UK/AUST 781974 FR/BEL 781976 HOLL
5PEG 5PWF	XD 7500 MARK XXI	CONTROL PC BOARD	782191 USA/CAN 782193 SP/AM 782194 UK/AUST 782195 FR/CAN
5PCG 5PKG	SD 900 DEVILLE 750	CONTROL PC BOARD	782190 USA/CAN 782192 FR/CAN
5PEH	XD 9500	CONTROL PC BOARD	782162 USA/CAN 782163 FR/CAN 782164 UK/AUST
5PCH	SD 900	CONTROL PC BOARD	782161 USA/CAN
5PEA 5PCA 5PKA 5PWA	XE 5200 SC 125 DEVILLE 125 MARK XV	CONTROL PC BOARD	780300 USA/CAN 780301 FR/CAN 780309 UK
5PEB	XE 6200	CONTROL PC BOARD	780315 USA/CAN
5PEC 5PCC 5PKC 5PWB	XD 6600 SD 265 DEVILLE 265 MARK XX	CONTROL PC BOARD	781450 USA/CAN 781451 FR/CAN 781452 SP/AM 781456 UK
5PED 5PCD 5PWC	XD 6700 SD 275 MARK XXV	CONTROL PC BOARD	781457 USA/CAN 781458 FR/CAN
5PEE	XD 5250	CONTROL PC BOARD	781806 USA/CAN 781807 FR/CAN

5L SERIES (VERSION 2) TYPEWRITERS

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5LCA	SE 100--(S/N 1256300 & ABOVE)	CONTROL PC BOARD (SINGLE SIDED)	751108 USA/CAN
5LEA	XE 5000--(S/N 1211300 & ABOVE)	POWER SUPPLY BOARD (SINGLE SIDED, TAN; STAKE PINS .100" APART AT J102)*	750021
5LKA	DEVILLE 100--(S/N 1118800 & ABOVE)	POWER SUPPLY BOARD (DOUBLE SIDED, GREEN; POST HEADER PINS .156" APART AT J102)*	364608
5LWB	MARK I--(S/N 1101001 & ABOVE)		
5LCP	SC 100	CONTROL PC BOARD	752192 USA/CAN
5LEN	XE 5000	POWER SUPPLY BOARD	750021

* LOOK AT BOARD COLOR TO IDENTIFY CORRECT REPLACEMENT PART NUMBER.

5LCM	SC 110 SR I	CONTROL PC BOARD (PLASTIC HOUSING KEYBOARD)	751740 USA/CAN
5LEL	XE 5100 SR I		
5LKC	DEVILLE 110 SR I	CONTROL PC BOARD (METAL HOUSING KEYBOARD)	751746 USA/CAN
5LWE	MARK I SR	POWER SUPPLY	750021
5LCN	SC 210 SR II	CONTROL PC BOARD (PLASTIC HOUSING KEYBOARD)	751560 USA/CAN
5LEM	XE 6100 SR II		
5LKD	DEVILLE 210 SR II	CONTROL PC BOARD (METAL HOUSING KEYBOARD)	751570 USA/CAN
5LWF	MARK II SR	POWER SUPPLY	750021
5LCJ	SD 250 SR II	CONTROL PC BOARD (PLASTIC HOUSING KEYBOARD)	752050 USA/CAN
5LEG	XD 6500 SR II		
5LKE	DEVILLE 250 SR II	CONTROL PC BOARD (METAL HOUSING KEYBOARD)	752060 USA/CAN
5LWG	MARK VII SR	POWER SUPPLY BOARD	751721
5LCL	SD 400 SR III	CONTROL PC BOARD (FOR 12 VOLT INDEX MOTOR)	752214 USA/CAN
5LEH	XD 8000 SR III	CONTROL PC BOARD (FOR 36 VOLT INDEX MOTOR)	752417 USA/CAN
		POWER SUPPLY BOARD	751721
5LEP	XD 8500	CONTROL PC BOARD	781461 USA/CAN
		CONTROL PC BOARD	781462 FR/CAN
		POWER SUPPLY BOARD	751721

NOTES: EXAMINE KEYBOARD TO DETERMINE WHETHER THE KEYBOARD HOUSING IS PLASTIC OR METAL. SEE 5 SERIES (VERSION 2) BULLETIN #12 FOR INFO ON THE 36 VOLT INDEX MOTOR.

5L SERIES (VERSION 1) TYPEWRITERS

SEE CONTROL PC BOARD AND POWER SUPPLY CHARTS ON PAGES 11 AND 12.

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5LCA	STERLING ELECTRONIC (BELOW S/N 1155300)		
5LCB	CITATION ELECTRONIC 100		
5LCC	CORONET ELECTRONIC I		
5LCE	CORONA ELECTRONIC (BELOW S/N 1104000)		
5LEA	ENTERPRISE ELECTRONIC (BELOW S/N 1142000)		
5LWA	ELECTRONIC MARK I		
	--TYPE A, (LONG BOARD) NO WATCHDOG, POST HEADERS, HIGH INERTIA MOTORS	743303	USA/CAN
	--TYPE A, (LONG BOARD) NO WATCHDOG, POST HEADERS, LOW INERTIA MOTORS	743316	USA/CAN
	--TYPE B, (SHORT BOARD) WATCHDOG, POST HEADERS	745839	USA/CAN
	--TYPE B, (SHORT BOARD) WATCHDOG, SOLDER TABS	747109	USA/CAN
	--POWER SUPPLY BOARD	741656	

5LCA	SE 100 (S/N 1155300 TO S/N 1256299)		
5LCE	CORONA ELECTRONIC (S/N 1104000 & ABOVE)		
5LEA	XE 5000 (S/N 1142000 TO S/N 1211299)		
5LKA	DEVILLE 100 (BELOW S/N 1118800)		
5LWB	MARK I (BELOW S/N 1101001)		
	--TYPE A, (LONG BOARD) NO WATCHDOG, POST HEADERS	353605	USA/CAN
	--TYPE A, (LONG BOARD) NO WATCHDOG, SOLDER TABS	353609	USA/CAN
	--TYPE B, (SHORT BOARD) WATCHDOG, SOLDER TABS	747113	USA/CAN
	--TYPE C, (LONG BOARD) WATCHDOG, SOLDER TABS	353607	USA/CAN
	--TYPE D, (SHORT BOARD) WATCHDOG, SOLDER TABS	749602	USA/CAN
	--POWER SUPPLY BOARD (DOUBLE SIDED; GREEN; POST HEADER PINS .156" APART ON J102)	741656	
	--POWER SUPPLY BOARD (INTERIM DESIGN), (SINGLE SIDED; TAN; NOTCHED HEAT SINK, STAKE PINS .100" APART AT J102)	364595	
	--POWER SUPPLY BOARD (SINGLE SIDED; TAN; STAKE PINS .100" APART AT J102)	750021	

SEE 5 SERIES (VERSION 1) ELECTRONIC TYPEWRITERS BULLETINS #12A-16, #28A, #45, #48, AND #52 FOR ADDITIONAL INFORMATION

5L SERIES (VERSION 1) TYPEWRITERS (continued)

MODEL PREFIX	MODEL DESCRIPTION	TYPE OF PC BOARD W/PART NUMBER(S) & LANGUAGE	
5LCD	STERLING ELECTRONIC II	CONTROL PC BOARD	747165 USA/CAN
		POWER SUPPLY BOARD	749515
5LCG 5LED	SE 200 XE 6000	CONTROL PC BOARD	748922 USA/CAN
		POWER SUPPLY (DOUBLE SIDED, GREEN, POST HEADER PINS .156" APART ON J102)	749515
		POWER SUPPLY (SINGLE SIDED, TAN, STAKE PINS .100" APART AT J102)	750021
5LCH 5LEE 5LKB 5LWC	SE 200 SR XE 6000 SR DEVILLE 200 SR MARK II SR	CONTROL PC BOARD	353614 USA/CAN
		POWER SUPPLY (DOUBLE SIDED, GREEN, POST HEADER PINS .156" APART ON J102)	749515
		POWER SUPPLY (SINGLE SIDED, TAN, STAKE PINS .100" APART AT J102)	750021
5LCF 5LEC	SD 300 XD 7000	CONTROL PC BOARD (POST HEADER PINS .156" APART AT J6)	749424 USA/CAN
		CONTROL PC BOARD (STAKE PINS .100" APART AT J6)	749436 USA/CAN
		POWER SUPPLY (DOUBLE SIDED, GREEN, POST HEADER PINS .156" APART ON J102)	749520
		POWER SUPPLY (SINGLE SIDED, TAN, STAKE PINS .100" APART AT J102)	750021
5LCI 5LEF	SD 300 SR XD 7000 SR	CONTROL PC BOARD (POST HEADER PINS .156" APART AT J6)	353616 USA/CAN
		CONTROL PC BOARD (STAKE PINS .100" APART AT J6)	353683 USA/CAN
		POWER SUPPLY (DOUBLE SIDED, GREEN, POST HEADER PINS .156" APART ON J102)	749515
		POWER SUPPLY (SINGLE SIDED, TAN, STAKE PINS .100" APART AT J102)	750021

SEE 5 SERIES (VERSION 1) ELECTRONIC TYPEWRITERS BULLETINS #41 & #48 FOR ADDITIONAL INFORMATION

SINGLE PITCH TYPEWRITERS

MODEL PREFIX	MODEL DESCRIPTION	PC BOARD PART NUMBERS(S) & LANGUAGE	
1EBA	TYPETRONIC	DRIVER	709715 USA/CAN
1EBB	TYPETRONIC II	DRIVER	353175
		CONTROL	353240 SPECIFY LANG.
1ECA	MEMORY CORRECT	DRIVER	709715 USA/CAN
1ECC	CITATION	DRIVER	709715 USA/CAN
1EPA	ULTRASONIC	DRIVER	709715 USA/CAN
1EPC	ULTRASONIC ONE PLUS	DRIVER	353112 USA/CAN

SINGLE PITCH PRINTERS

1PTP	TP-I (PARALLEL)	DRIVER	715456 TYPE 1 USA/CAN
		INTERFACE	719084 TYPE 1 USA/CAN
		DRIVER	721303 TYPE 2 USA/CAN
		INTERFACE	719886 TYPE 2 USA/CAN
1PTS	TP-I (SERIAL)	DRIVER	715456 TYPE 1 USA/CAN
		INTERFACE	720955 TYPE 1 USA/CAN
		DRIVER	721303 TYPE 2 USA/CAN
		INTERFACE	719884 TYPE 2 USA/CAN

SEE ELECTRONIC TEXT PRINTERS SERVICE BULLETIN #7

1PTD	TP-II	DRIVER	353284
		INTERFACE	353407

MULTIPITCH TYPEWRITERS

1MCA	MEMORY CORRECT III MESSENGER	353381 USA/CAN
1MCB	CITATION III MESSENGER	
1MCC	MEMORY CORRECT III	
1MKA	DEVILLE III MESSENGER	
1MPA	ULTRASONIC III MESSENGER	
1MPD	ULTRASONIC III	
1MCD	MEMORY CORRECT II	353384 USA/CAN
1MPE	ULTRASONIC II	353385 SP/AM 353386 FR/CAN
1MCD	MEMORY CORRECT II W/DEEP DEPRESSION KYBD	353384X USA/CAN
1MPE	ULTRASONIC II W/DEEP DEPRESSION KEYBOARD	

SEE MULTIPITCH TYPEWRITERS BULLETIN #20

1MCE	MEMORY CORRECT 400 MESSENGER	726673 USA/CAN
1MCF	MEMORY CORRECT 300	
1MCH	CITATION 300 MESSENGER	
1MPG	ULTRASONIC 350 MESSENGER	
1MPJ	S-II, VERSION 2 (HAS WORD ERASE KEY)	726673 USA/CAN
1MPJ	S-11, VERSION 1 (HAS MARGIN RELEASE KEY)	729480 USA/CAN
1MCG	MEMORY CORRECT 200	726688 USA/CAN
1MPH	ULTRASONIC 250	726689 SP/AM 726690 FR/CAN
1MPF	ULTRASONIC 450 MESSENGER	726682 USA/CAN

SEE 1 SERIES MULTIPITCH TYPEWRITER BULLETINS #19, 22, 23.

MULTIPITCH PRINTERS

MODEL PREFIX	MODEL DESCRIPTION	PC BOARD P/N(S) & LANGUAGE	
1PMA	L-1000/TP-II PLUS	DRIVER	353391
		INTERFACE	353392

MESSENGER MODULE

R001		726295	ALL

DOT MATRIX PRINTERS

1D11	D100	590295	US/EC
1D1A	D200	590088	US/EC
1D1C	D200	590782	US/EC
1D2A	D300	590414	US/EC
1D2C	D300	590729	US/EC
1D3A	FASTEXT 80	590663	US/EC
1DCA	SERIAL INTERFACE	590826	US/EC

GRAPHTEXT 90

1AAA	PC BOARD	594029	US/EC

TYPETRONIC III/EL 4000

2BAA	7801 B ELECTRONICS, RAM PC BOARD	590496	US/EC
	7801 A ELECTRONICS, RAM PC BOARD	590714	US/EC
	7801 A AND 7801 B ELECTRONICS, CONTROL PC BOARD	353-30006	

5 SERIES (VERSION 1) CONTROL PC BOARD CHARTS

5LEA ENTERPRISE ELECTRONIC BELOW S/N 1142000
5LCA STERLING ELECTRONIC BELOW S/N 1155300

US/ENGLISH CANADIAN

CONTROL PCB TYPE	CONTROL PCB	MOTORS	SLAVE EPROM U201	TYPE OF CABLE CONNECTOR (J2 & J4)	CARRIER RIBBON CABLES	POWER SUPPLY HARNESS	WATCHDOG CIRCUITRY	INDEX MOTOR	REFERENC BULLETIN
A Long	743303	High Inertia Carrier-741273 Element-741274	729279 High Inertia	Post Headers	741399 (Short) 741400 (Long)	741509	External Watchdog PCB Needed	745285	12A 15
A Long	743316	Low Inertia Carrier-745286 Element-745287	729292 Low Inertia	Post Headers	741399 (Short) 741400 (Long)	741509	External Watchdog PCB Needed	745285	12A 15
B Short	745839	Low Inertia Carrier-745286 Element-745287	N/A Masked Processor Low Inertia	Post Headers	741399 (Short) 741400 (Long)	745911	Internal On Board	745288	13
B Short	747109	Low Inertia Carrier-745286 Element-745287	N/A Masked Processor Low Inertia	Solder Tabs	747047 (Short) 747048 (Long)	745911	Internal On Board	745288	13

FRENCH CANADIAN/SPANISH AMERICAN

CONTROL PCB TYPE	CONTROL PCB	MOTORS	SLAVE EPROM U201	TYPE OF CABLE CONNECTOR (J2 & J4)	CARRIER RIBBON CABLES	POWER SUPPLY HARNESS	WATCHDOG CIRCUITRY	INDEX MOTOR	REFERENC BULLETIN
A Long	743305-FC 743307-SA	High Inertia Carrier-741273 Element-741274	729279 High Inertia	Post Headers	741399-(Short) 741400 (Long)	741509	External Watchdog PCB Needed	745285	12A 15
A Long	743318-FC	Low Inertia Carrier-745286 Element-745287	729293 Low Inertia	Post Headers	741399 (Short) 741400 (Long)	741509	External Watchdog PCB Needed	745285	12A 15
C Long	745414-FC 745416-SA	Low Inertia Carrier-745286 Element-745287	729293 Low Inertia	Post Headers	741399 (Short) 741400 (Long)	741509	Internal On Board	745285	14
C Long	747137-FC 747139-SA	Low Inertia Carrier-745286 Element-745287	729293 Low Inertia	Solder Tabs	747047 (Short) 747048 (Long)	741509	Internal On Board	745285	14

5LEA XE-5000 S/N 1142000 TO S/N 1211299
5LCA SE-100 S/N 1155300 TO S/N 1256299

US/ENGLISH CANADIAN

CONTROL PC BOARD TYPE	PART NUMBER	TYPE OF CABLE CONNECTOR (J2 & J4)	CARRIER RIBBON CABLES	POWER SUPPLY HARNESS	WATCHDOG CIRCUITRY	REFERENCE BULLETINS
A LONG	353605	POST HEADERS	741399 (SHORT) 741400 (LONG)	741509	EXTERNAL WATCHDOG PCB NEEDED	13, 14, 15
A LONG	353609	SOLDER TABS	747047 (SHORT) 747048 (LONG)	741509	EXTERNAL WATCHDOG PCB NEEDED	13, 14, 15
B SHORT	747113	SOLDER TABS	747047 (SHORT) 747048 (LONG)	745911	INTERNAL ON BOARD	13
C LONG	353607	SOLDER TABS	747047 (SHORT) 747048 (LONG)	741509	INTERNAL ON BOARD	14
D SHORT	749602	SOLDER TABS	747047 (SHORT) 747048 (LONG)	749598 (WIRES: 4 ORANGE 1 BLACK)	INTERNAL ON BOARD	35

Shaded areas indicate variations between one Control PC Board Type and the next.

5 SERIES DC SUPPLY PC BOARDS

MODEL GROUP	DC SUPPLY PC BOARD	SINGLE/ DOUBLE SIDED	J102 PIN CENTERS	BOARD OR HEAT SINK MOUNTS IN CASING BASE	POWER SUPPLY HARNESS	REFERENCE BULLETINS
5LCA, 5LCB, 5LCC, 5LCE, 5LEA, 5LKA, 5LWA, 5LWB (ORIGINAL VERSION)	741656 (subs for 745898)	DOUBLE	.156" CENTERS	BOARD MOUNTS	741509 (W/TYPE "A" & "C" CONTROL PC BDS) 745911 (W/TYPE "B" CONTROL PC BD) 749598 (W/TYPE "D" CONTROL PC BD)	DC SUPPLY PC BOARDS: #45
	364595	SINGLE	.100" CENTERS	BOARD MOUNTS	751047 (W/TYPE "C" CONTROL PC BD) 751046 (W/TYPE "D" CONTROL PC BD)	CONTROL PC BOARDS: #13, 14, 15, 16, 28A, & 35A
	*750021	SINGLE	.100" CENTERS	HEAT SINK MOUNTS	751047 (W/TYPE "C" CONTROL PC BD) 751046 (W/TYPE "D" CONTROL PC BD)	
5LCD, 5LCG, 5LCH, 5LED, 5LEE, 5LKB, 5LWC	749515	DOUBLE	.156" CENTERS	BOARD MOUNTS	741509	#48
	*750021	SINGLE	.100" CENTERS	HEAT SINK MOUNTS	751044	
5LCF, 5LCI, 5LEC, 5LEF	749520	DOUBLE	.156" CENTERS	HEAT SINK MOUNTS	741509 (.156" CENTERS ON CONTROL PC BD) 751044 (.100" CENTERS ON CONTROL PC BD)	#41
	*750021	SINGLE	.100" CENTERS	HEAT SINK MOUNTS	751045	

SHADED AREAS INDICATE VARIATIONS BETWEEN ONE DC SUPPLY PC BOARD AND THE NEXT FOR EACH MODEL GROUP

*NOTE: PC BOARD P/N 750021 MAY BE SUBSTITUTED BY P/N 751721

REPLACEMENT PC BOARD PART NUMBERS

THIS LIST PROVIDES A CROSS-REFERENCE FOR MANUFACTURER LABELS ON 5L SERIES, 5A, 5C, 5D, & 5P SERIES, AND PWP PC BOARDS AND THE APPROPRIATE SERVICE STORES PART NUMBER FOR EACH LABEL.

PLEASE ORDER BOARDS BY SERVICE STORES PART NUMBER, NOT BY NUMBER ON LABEL.

LABEL NO. ON BOARD	SER. STORES PART NUMBER
353605	353605
353606	353605
353607	353607
353608	747113
353609	353609
353610	353605
353611	353605
353612	353607
353614	353614
353615	353614
353616	353616
353617	353616
353627	353614
353655	353614
353667	747113
353682	353683
353683	353683
353684	353614
353686	353614
353750	751740
353751	751560
364567	750021
364568	750021
364569	750021
364570	750021
364585	750021
364586	741656
364595	364595
364608	364608
364686	752050
364855	781461
367252	771525
367253	771525
367254	771525
367255	771525
367256	771525
367257	771535
367258	771535
367259	771535
367260	771535
367261	771535
367265	771525
367266	771525
367267	771525
367268	771525
367269	771525
367271	771535
367272	771535
367273	771535
367274	771535
367275	771535
367292	771535
741656	741656
743303	743303
743304	743303
743315	743316
743316	743316
745838	745839
745839	745839
745898	741656
746287	749515
747108	747109
747109	747109
747110	747109
747111	747109
747112	747113
747113	747113
747114	747113
747115	747113
747162	747165
747165	747165
748922	748922
748925	748922
748940	748922
748943	748922
748952	748922
748955	748922
748959	353614
748963	748922
748966	748922
749418	749424
749419	749424
749424	749424
749425	749424
749435	749436
749436	749436
749440	749439
749441	353683
749515	749515
749520	749520
749601	749602
749602	749602
749607	749602
749608	749602
750021	750021
751107	751108
751108	751108
751560	751560
751561	751560
751570	751570
751571	751570
751572	751572
751573	751572
751574	751574
751575	751574
751578	751570
751579	751570
751721	751721
751722	751721
751740	751740
751746	751746

Continued ...

LABEL NO. ON BOARD	SER. STORES PART NUMBER
752050	752050
752051	752050
752060	752060
752061	752060
752062	752062
752063	752062
752064	752535
752065	752535
752192	752192
752193	752192
752214	752214
752215	752214
752216	752216
752217	752216
752218	752218
752219	752218
752224	752214
752225	752214
752226	752216
752227	752216
752228	752218
752229	752218
752265	751721
752266	751721
752267	751721
752383	752060
752384	752060
752416	752417
752417	752417
752418	752419
752419	752419
752420	752421
752421	752421
752535	752535
760023	760023
760425	760023
760426	760023
760560	760565
760565	760565
760715	760565
760716	760716
760720	760565
760721	760716

LABEL NO. ON BOARD	SER. STORES PART NUMBER
765300	765302
765301	765302
765302	765302
765304	765302
765305	765305
765306	765306
765320	765321
765321	753321
765330	765330
765331	765330
766110	765302
766111	765305
766112	765306
768205	768210
768210	768210
768211	768210
768212	768212
768213	768212
768214	768214
768215	768215
770386	770400
770387	770400
770388	770400
770389	770400
770390	770400
770391	770400
770392	770400
770393	770400
770400	770400
770401	770400
770402	770400
770403	770400
770404	770400
770405	770400
770410	770400
770411	770400
770412	770400
770414	770414
770415	770414
770416	770414
770417	771525

LABEL NO. ON BOARD	SER. STORES PART NUMBER
771150	771150
771155	771155
771156	771156
771157	771161
771158	771158
771159	771155
771160	771156
771161	771161
771280	771280
771281	771281
771282	771282
771283	771283
771284	771280
771285	771282
771290	772610
771291	772611
771292	772612
771293	772613
771294	772610
771295	772612
771520	771525
771521	771525
771522	771525
771523	771525
771524	771525
771525	771525
771526	771525
771527	771525
771528	771525
771529	771525
771530	771535
771531	771535
771532	771535
771533	771535
771534	771535
771535	771535
771536	771535
771537	771535
771538	771535
771539	771535
771550	772610
771551	772611
771552	772612
771553	772613
771554	772610
771555	772612

Continued ...

LABEL NO. ON BOARD	SER. STORES PART NUMBER
772080	772800
772081	772800
772082	772800
772083	772800
772084	772800
772085	772800
772086	772800
772091	772091
772092	772092
772093	772093
772095	772095
772101	772091
772102	772092
772103	772093
772104	772095
772610	772610
772611	772611
772612	772612
772613	772613
772614	772610
772615	772612
772616	772610
772617	772611
772618	772612
772619	772613
772620	772610
772621	772612
772800	772800
772801	772800
772802	772800
772803	772800
772804	772800
772805	772800
772806	772800
772811	772091
772812	772092
772813	772093
772814	772095
772830	772800
772831	772800
772832	772800
772833	772800
772834	772800
772835	772800
772836	772800

LABEL NO. ON BOARD	SER. STORES PART NUMBER
780300	780300
780301	780301
780303	780309
780304	780300
780305	780301
780308	780300
780309	780309
780315	780315
780329	780315
781420	781420
781421	781421
781422	781422
781426	781426
781427	781427
781428	781428
781435	781420
781436	781421
781437	781422
781438	781426
781439	781427
781440	781428
781441	781611
781442	781612
781450	781450
781451	781451
781452	781452
781453	781450
781456	781456
781457	781457
781458	781458
781459	781457
781461	781461
781462	781462
781465	781461
781466	781462

LABEL NO. ON BOARD	SER. STORES PART NUMBER
781611	781611
781612	781612
781806	781806
781807	781807
781960	781960
781970	781960
781971	781971
781972	781972
781973	781973
781974	781974
781976	781976
782161	782161
782162	782162
782163	782163
782164	782164
782190	782190
782191	782191
782192	782192
782193	782193
782194	782194
782195	782195

SMITH CORONA

PWP 40 (5DEA)
PWP 3 (5DCA)

COMMITMENT TO EXCELLENCE
SMITH CORONA
MADE IN U.S.A.

PARTS MANUAL

Printed in U.S.A. Form 3-0763
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PREFACE

This comprehensive Parts Manual lists and illustrates parts and electronic components necessary for the maintenance of the following Smith Corona 5D Series Personal Word Processors:

MODEL PREFIX	MODEL NAME	COLOR	MODEL PREFIX	MODEL NAME	COLOR
5DCA	PWP 3	GRAY	5DEA	PWP 40	PLATINUM

Unique International parts are listed separately on each page where applicable. All Keybuttons are listed on the same page with a country designator after the item description -- see the Keyboard Codes at the top of each page for Color and Country.

A Reference Number is used on parts illustrations, and a Component Number is used for each Component on the Control PC Board diagrams. The number is listed numerically in the parts listing beneath the illustration or diagram, and refers directly to the part number.

When an illustrated part has variations in appearance, color, voltage, etc., the reference number appears more than once in the "REF" or "COMPONENT" column. Use extreme care in selecting parts in these areas.

If the part number is known, the page on which it is listed can readily be found by reference to the numerical parts listing at the end of the Manual.

ORDERING INSTRUCTIONS: State the correct part number on all parts orders. State additional information if asked for. It is not necessary to state the part name unless the part number is not known. Do not order by reference numbers.

NOTICE

Smith Corona encourages PC Board repair by qualified technicians. If, however, after trying to repair a PC Board, the Board still does not work properly, return the Board to Smith Corona National Service Stores for warranty or repair exchange.

IMPORTANT: SMITH CORONA DOES NOT REPLACE OR EXCHANGE DAMAGED PC BOARDS (IN OR OUT OF WARRANTY).

Boards will be returned as irreparable and no credits or exchanges issued when:

- There are missing components
- There are damaged or lifted traces
- There are solder burns
- There is any other Board damage which makes the Board irreparable

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

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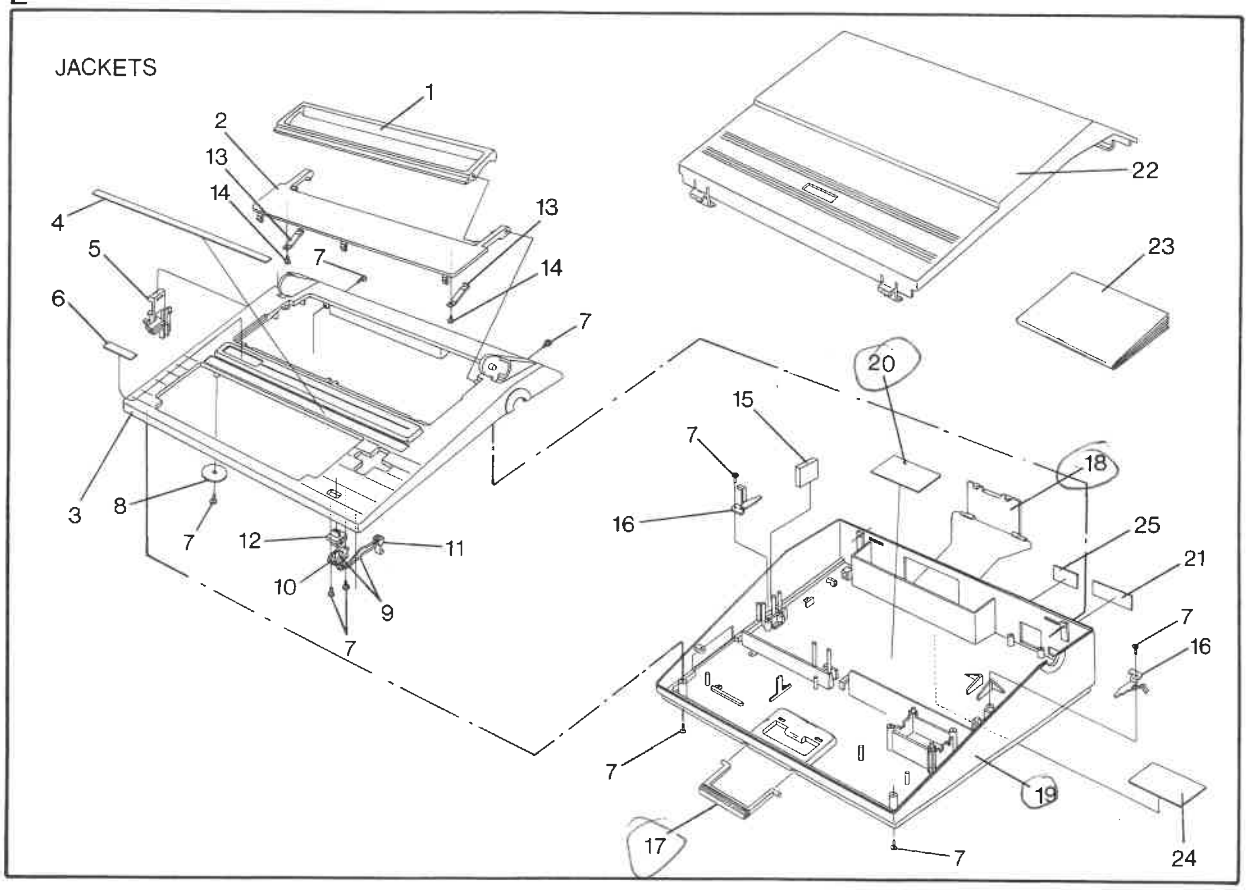
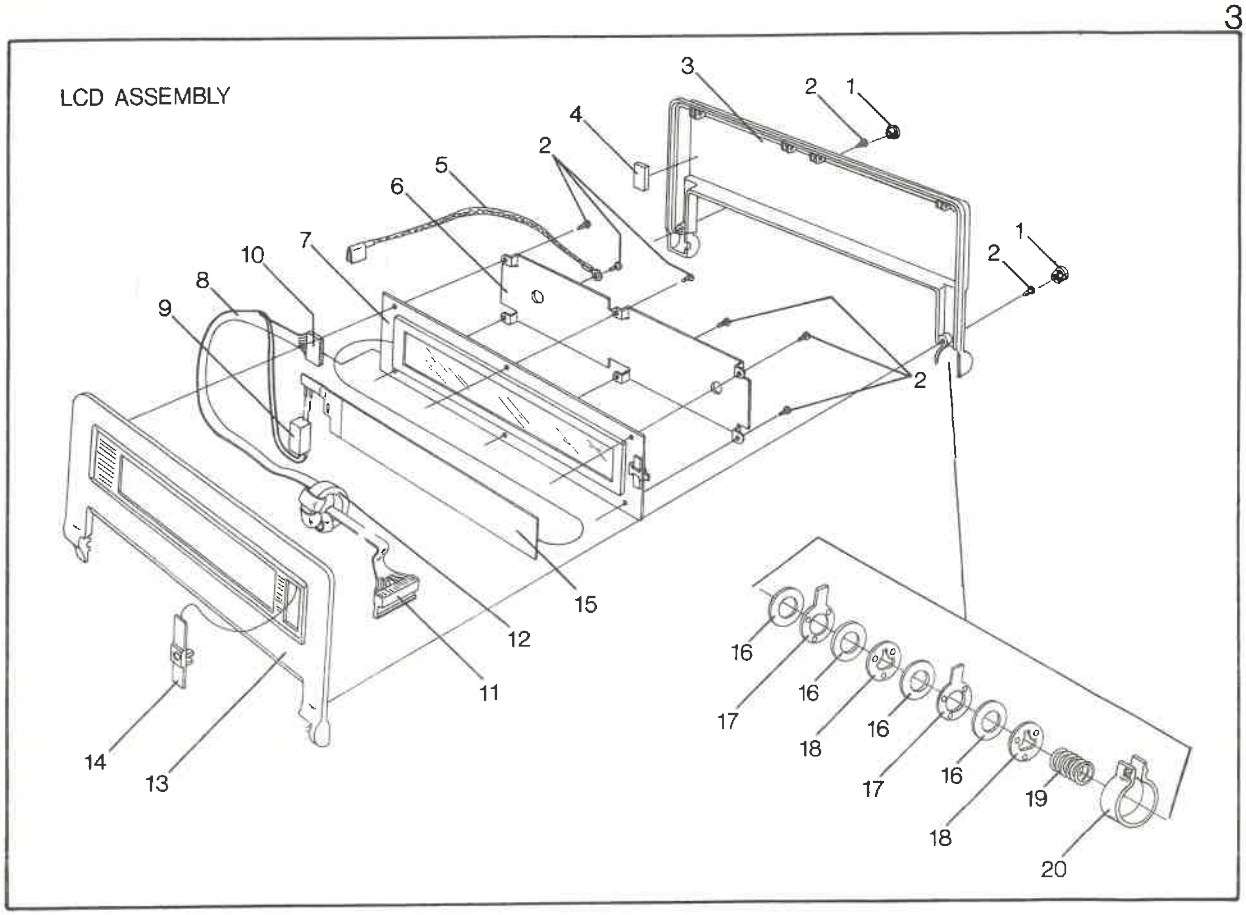


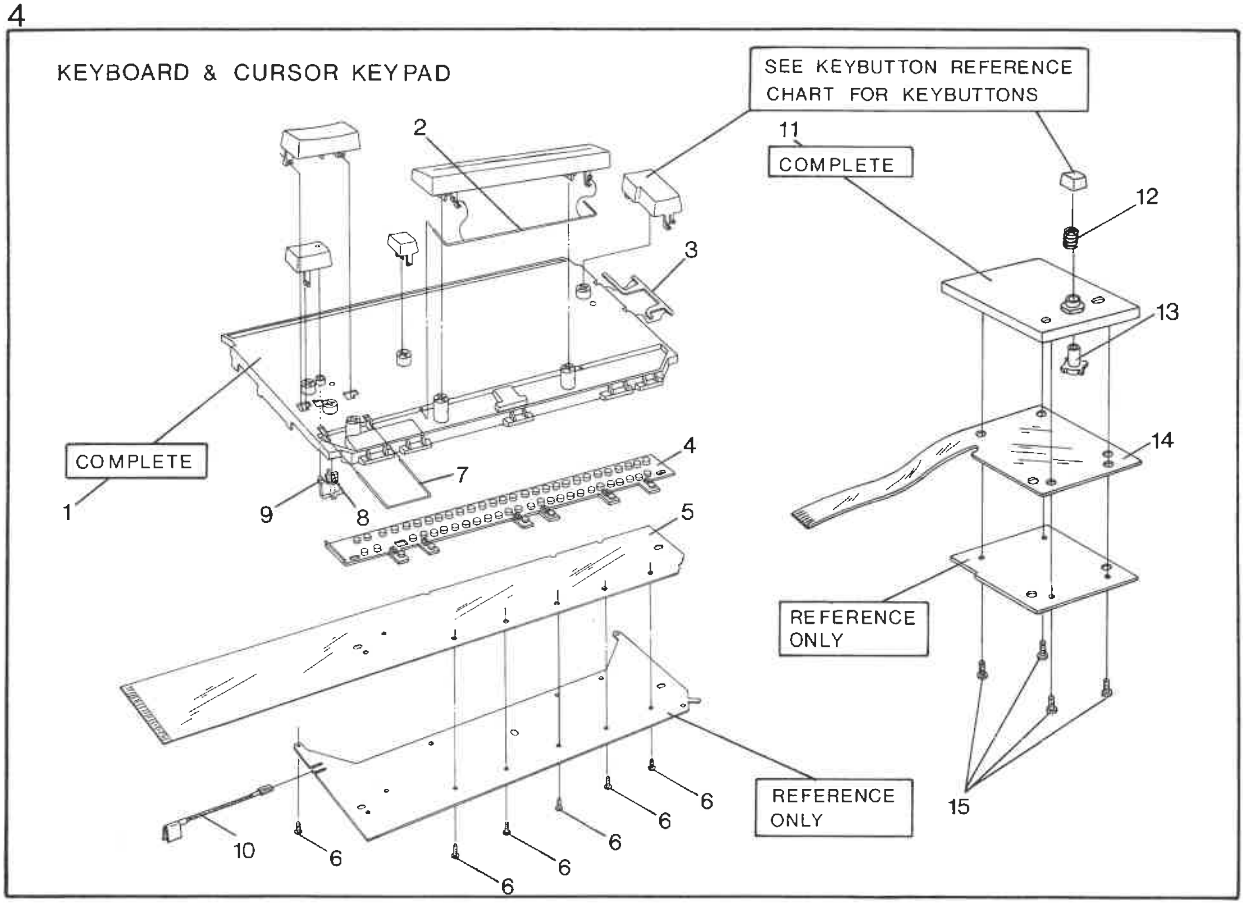
REF	PART NUMBER	PART NAME	QTY
1	768320	Paper Bail, Black	1
1	768321	Paper Bail, Platinum	1
2	768050	Deck, Gray	1
2	768051	Deck, Platinum	1
3	768170	Mask, Platinum (PWP 40) (W/Ref 6)	1
3	768171	Mask, Gray (PWP 3) (W/Ref 6)	1
4	768160	Overlay (PWP 40)	1
4	768161	Overlay (PWP 3)	1
5	768130	Paper Release Slider, Platinum	1
5	768131	Paper Release Slider, Gray	1
6	729572	Nameplate	1
7	747258	Screw	9
8	768300	Washer	1
9	765891	Mode Switch Assembly, (W/Ref 10 & 11)	1
10	768107	Mode Switch	1
11	736900	Connector, 2 Position	1
12	765131	Mode Switch Cap	1
13	770000	Paper Bail Detent	2
14	770672	Screw	2
15	781890	Casing Base Foam	1
16	770829	Foot Retainer	2
17	768150	Carrying Case Handle, Gray	1
17	768151	Carrying Case Handle, Platinum	1
18	765160	Cord Storage Door, Platinum	1
18	765161	Cord Storage Door, Gray	1
19	768020	Casing Base, Gray	1
19	768021	Casing Base, Platinum	1
20	772700	Warning Label	1
21	768109	Fuse Rating Label	1
22	768090	Carrying Case Lid, Gray	1
22	768091	Carrying Case Lid, Platinum	1

REF	PART NUMBER	PART NAME	QTY
		OWNER'S MANUALS	
23	781996	Owner's Manual USA & Canada, UK	1
23	781997	Owner's Manual, French Canadian	1
23	781998	Owner's Manual, Spanish American	1
		INTERNATIONAL JACKETING PARTS	
19	768020	Casing Base, Gray, French Canadian	1
19	768021	Casing Base, Platinum, French Canadian, Spanish American	1
19	768022	Casing Base, Platinum, UK	1
24	770759	Electric Rating Label, UK	1
25	771425	Country of Origin Label, UK	1



REF	PART NUMBER	PART NAME	QTY
1	765110	Hole Cover, Platinum	1
1	765111	Hole Cover, Gray	1
2	770672	Screw	8
3	768070	Upper LCD Housing, Gray	1
3	768071	Upper LCD Housing, Platinum	1
4	765828	Foam	1
5	353909	Ground Cable	1
6	768105	LCD Ground Shield	1
7	761050	LCD	1
8	768230	LCD Cable/Inverter Assembly, (W/Ref 9-11)	1
9	761092	DC/AC Inverter	1
10	760804	Connector, 10 Pin	1
11	751064	Connector, 12 Pin	1
12	760883	Toroid	1
13	768060	Lower LCD Housing, Gray	1
13	768061	Lower LCD Housing, Platinum	1
14	768190	LCD Switch Slide, Gray	1
14	768191	LCD Switch Slide, Platinum	1
15	761050	EL Panel	1
16	768306	Friction Brake Pad	4
17	768004	Friction Plate	2
18	768305	Friction Disc	2
19	768007	Brake Spring	1
20	768140	Slip Ring, Gray	1
20	768141	Slip Ring, Platinum	1

KEYBOARD & CURSOR KEYPAD



REF	PART NUMBER	PART NAME	QTY
1	778361	Keyboard Complete, Platinum, USA & Canada	1
2	778281	Spacebar Bail	1
3	778280	Return Bail	1
4	778340	Molded Switches	1
5	778349	Flexible Circuit	1
6	780424	Screw	12
7	778282	Left Shift Bail	1
8	778347	LED Contact Washer	1
9	778316	LED	1
10	760908	Ground Cable Assembly	1
11	765000	Cursor Keypad Complete	1
12	742968	Keybutton Spring	5
13	742970	Keyswitch Plunger	5
14	758456	Cursor Keypad Mylar PC Board	1
15	742978	Screw	4

KEYBOARDS FOR INTERNATIONAL MODELS ONLY

1	778364	Keyboard Complete, Platinum, French Canadian	1
1	778365	Keyboard Complete, Platinum, Spanish American	1
1	778366	Keyboard Complete, Platinum, UK	1

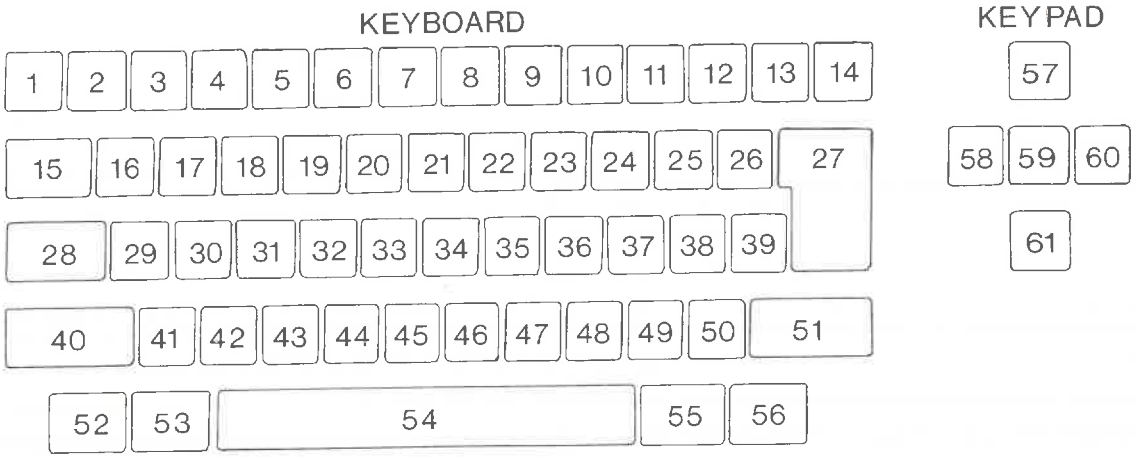
KEYBUTTON REFERENCE CHART

KEYBOARD CODES:

US (UNITED STATES)	--	1063 KEYBOARD
EC (ENGLISH CANADIAN)	--	1063 KEYBOARD
FC (FRENCH CANADIAN)	--	1132 KEYBOARD
UK (UNITED KINGDOM)	--	5108 KEYBOARD
SA (SPANISH AMERICAN)	--	1492 KEYBOARD

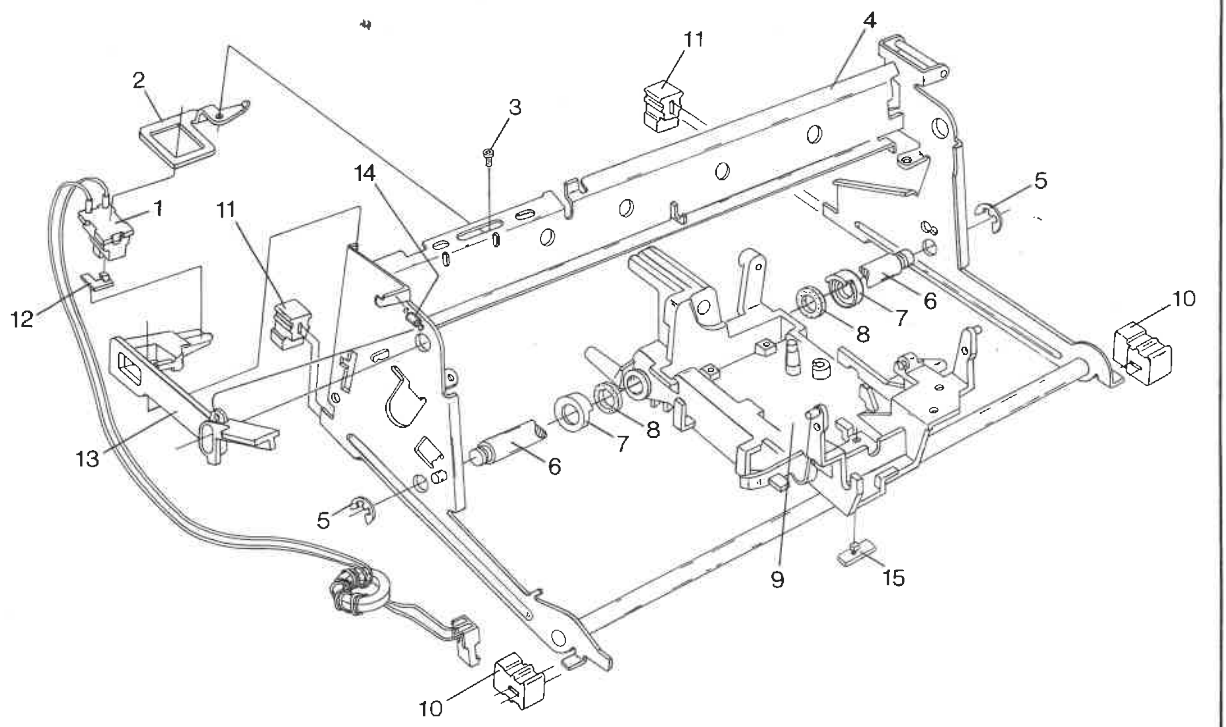
COLOR CODE:

ALL PLATINUM GRAY



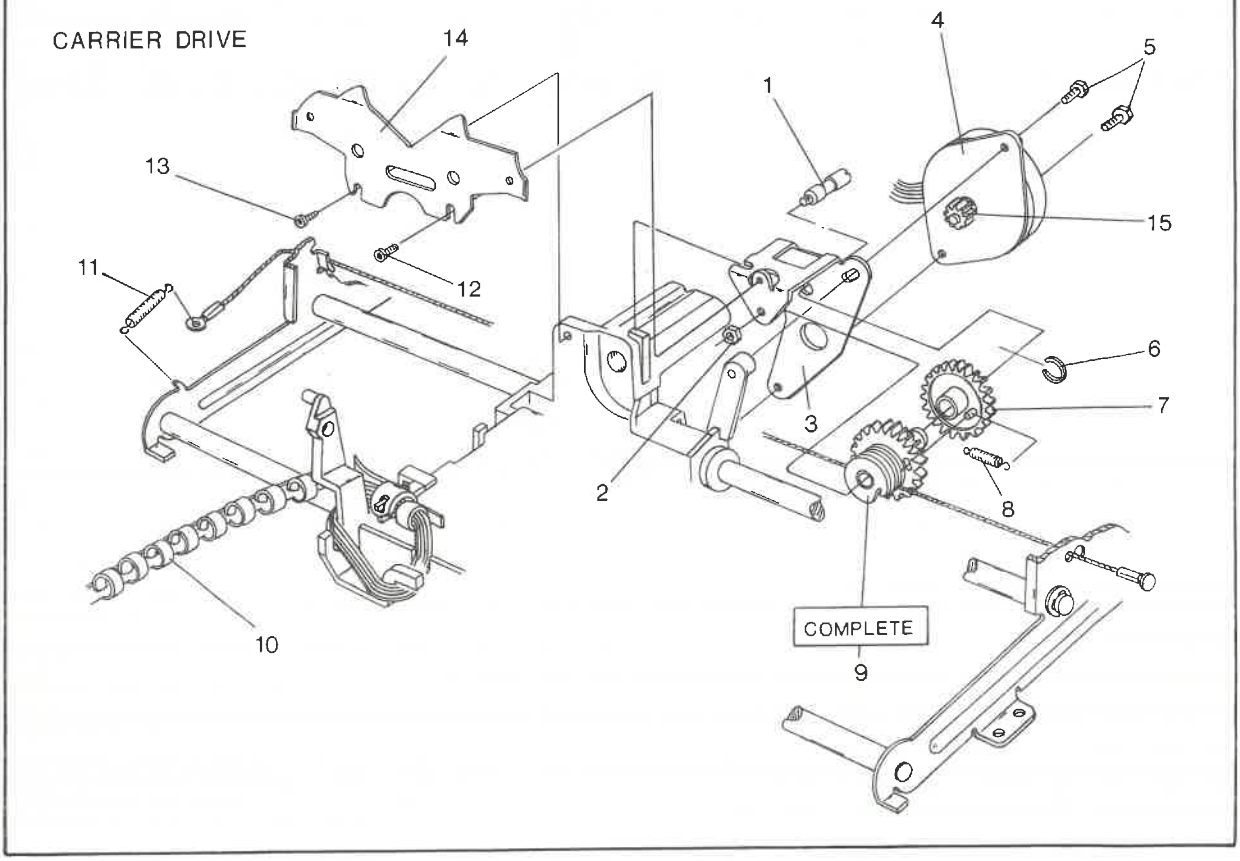
REF	PART NUMBER	ITEM
1	778576	TAB SET
2	778577	1 US, EC
3	778578	2 US, EC
4	778579	3 US, EC
5	778580	4 US, EC
6	778581	5 US, EC
7	778582	6 US, EC
8	778407	7 US, EC
9	778408	8 US, EC
10	778409	9
11	778410	0 (ZERO)
12	778411	_ OVER -
13	778412	+ OVER =
14	778413	BACKSPACE
15	778583	TAB/TAB CLEAR
16	778592	Q
17	778596	W
18	778597	E
19	778598	R
20	778599	T
21	778600	Y
22	778601	U
23	778587	I/IN
24	778423	O
25	778424	P
26	778425	1/4 OVER 1/2 AND SECTION SIGN US, EC
27	778426	RETURN/RELOCATE
28	778427	LOCK
29	778428	A
30	778588	S/STOP
31	778573	D/DICTIONARY
32	778574	F/FIND
33	778432	G
34	778433	H
35	778434	J
36	778589	K/KEYBOARD II
37	778590	L/LIST
38	778437	: OVER ; US, EC
39	778438	QUOTE/APOSTROPHE/ PARAGRAPH US, EC
40	778439	SHIFT (LEFT)
41	778440	Z
42	778441	X
43	778442	C
44	778591	V/VIEW
45	778575	B/BOLD
46	778445	N
47	778446	M
48	778447	, OVER , US, EC
49	778594	./LEFT BRACKET US, EC
50	778595	?/DIAGONAL/RIGHT BRACKET US, EC
51	778450	SHIFT (RIGHT)
52	778451	CODE
53	778452	MARGIN L/R
54	778453	SPACEBAR/HALFSPACE
55	778454	WORDERASER
56	778455	CORRECT
		UNIQUE INTERNATIONAL KEYBUTTONS
2	778602	1 FC
2	778608	1 SA
2	778615	1 UK
3	778603	2 FC
3	778609	2 SA
3	778616	2 UK
4	778604	3 FC
4	778617	3 UK
4	778610	3 SA
5	778605	4 FC
5	778611	4 SA
5	778618	4 UK
6	778606	5 FC
6	778612	5 SA
6	778619	5 UK
7	778459	6 FC
7	778613	6 SA
7	778620	6 UK
8	778407	7 FC, UK
8	778614	7 SA
9	778408	8 UK
9	778460	8 FC, SA
26	778425	1/4 OVER 1/2 AND SECTION SIGN FC
26	778479	UMLAUT/ACUTE/DIAGONAL SA
26	778491	ONE QUARTER/ONE HALF/ ONE THIRD UK
38	778437	: OVER ; FC, UK
38	778480	N TILDE SA
39	778469	CIRCUMFLEX/GRAVE/ PARAGRAPH FC
39	778481	:/;/INVERTED ! SA
39	778492	QUOTES/APOSTROPHE/ THREE QUARTERS UK
48	778447	, OVER , UK
48	778470	? OVER , FC
48	778482	DEGREE OVER COMMA SA
49	778448	./. SA
49	778594	./LEFT BRACKET FC, UK
50	778595	?/DIAGONAL/RIGHT BRACKET UK
50	778607	c CEDILLA/e ACUTE/ RIGHT BRACKET FC
50	778483	?/INVERTED ? SA

CARRIER MOLDING, RAILS, & FRAMES



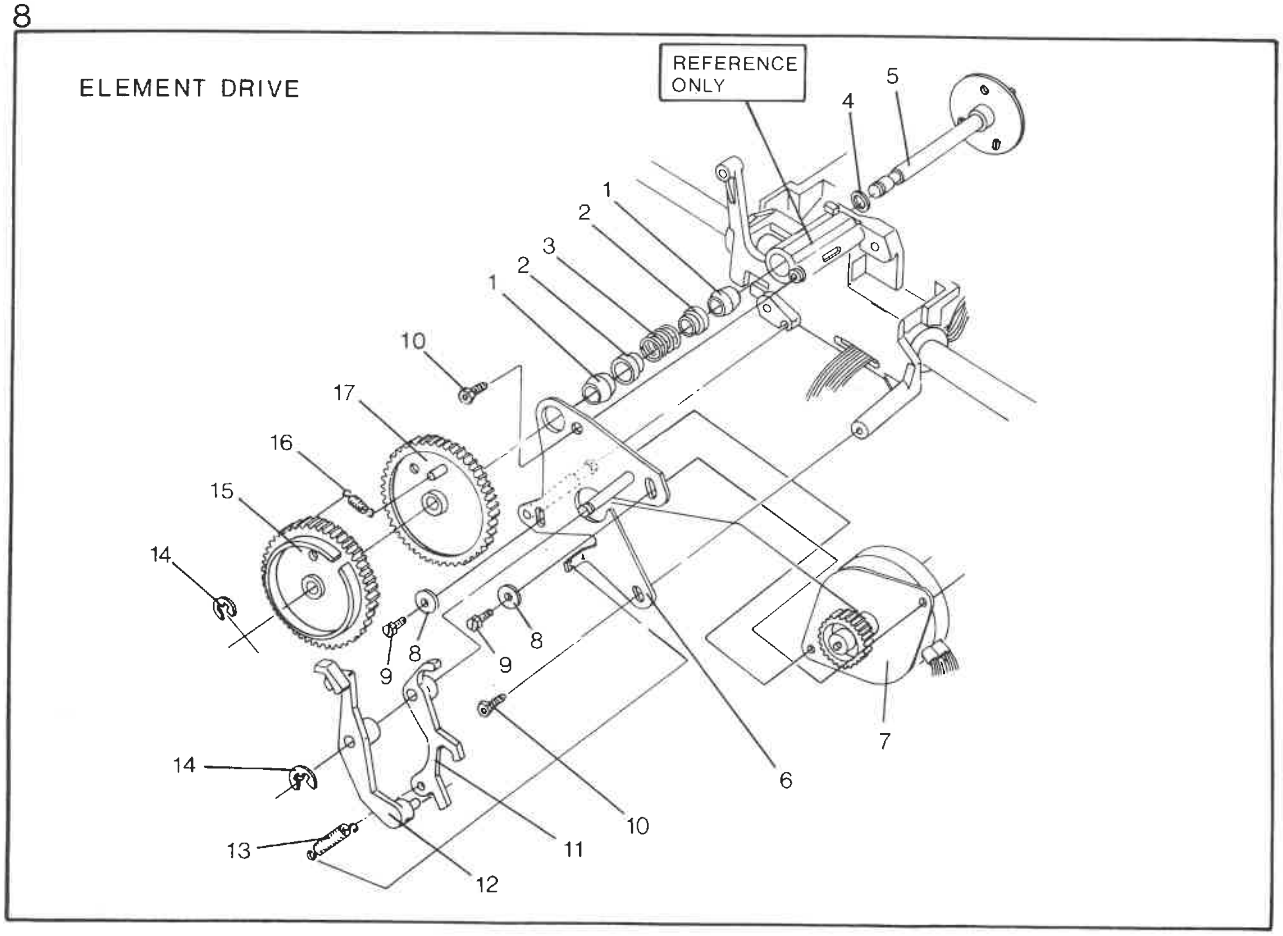
REF	PART NUMBER	PART NAME	QTY
1	771603	Left End Switch Assembly, (W/Toroid)	1
2	751812	Switch Mount Bracket	1
3	748366	Screw	1
4	768254	Frame Assembly Complete	1
5	105100	Retaining Ring	2
6	770265	Rear Carrier Shaft	1
7	740257	Wiper Retainer	2
8	740084	Wiper	2
9	771952	Molded Carrier, (W/Ref 15)	1
10	770435	Front Foot	2
11	768308	Rear Foot	2
12	771270	Switch Cap	1
13	768307	Actuator	1
14	771271	Spring	1
15	780411	Slider	1

CARRIER DRIVE



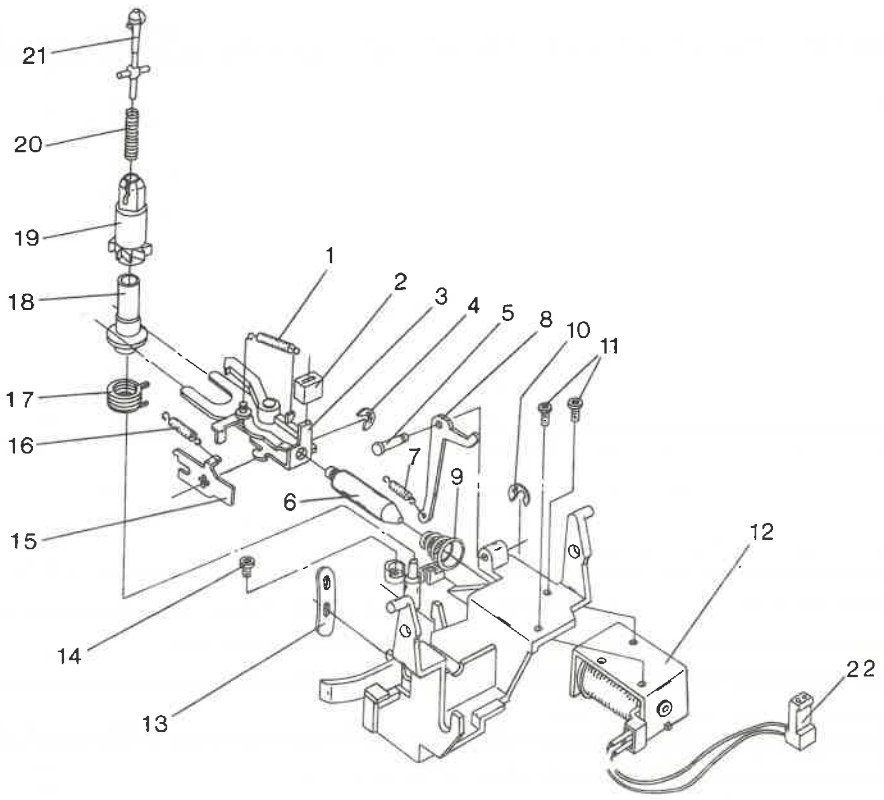
REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	747082	Capstan Pivot Screw	1	9	770319	Gear/Cable Assembly	1
2	100200	Capstan Nut	1	10	770317	Wire Binder Retainer	1
3	751144	Capstan Bracket	1	11	770430	Carrier Cable Spring	1
4	770171	Carrier Motor Assembly	1	12	748366	Screw	1
5	747258	Carrier Motor Screw	2	13	770672	Screw	1
6	741374	Retaining Ring	1	14	771911	Line Indicator	1
7	743088	Carrier Drive Gear	1	15	364646	Carrier Motor Gear	1
8	439272	Capstan Scissor Spring	1				

ELEMENT DRIVE



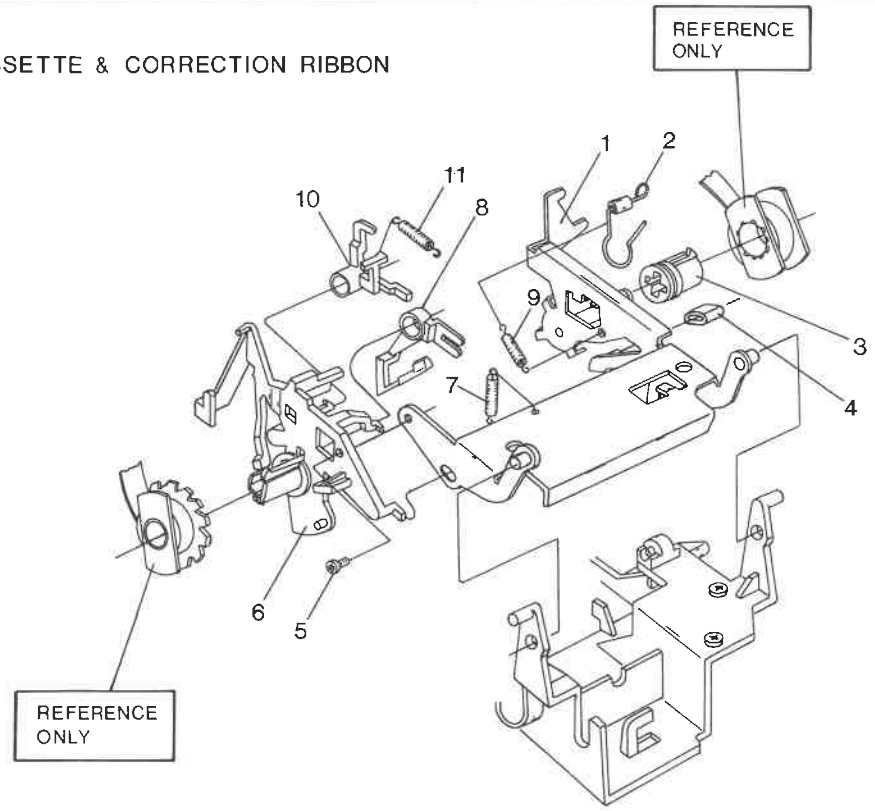
REF	PART NUMBER	PART NAME	QTY
1	740143	Element Shaft Bearing	2
2	752734	Element Shaft Bushing	2
3	745897	Element Shaft Spring	1
4	752735	Thrust Washer	1
5	740004	Element Shaft	1
6	749961	Element Motor Plate	1
7	770176	Element Motor Assembly	1
8	105090	Washer	2
9	770297	Screw	2
10	747258	Screw	2
11	749967	Element Home Actuator	1
12	751817	Element Home Latch	1
13	770685	Element Latch Spring	1
14	467980	Retaining Ring	2
15	749965	Element Gear	1
16	771260	Element Gear Spring	1
17	745321	Element Shaft Gear	1

RIBBON DRIVE

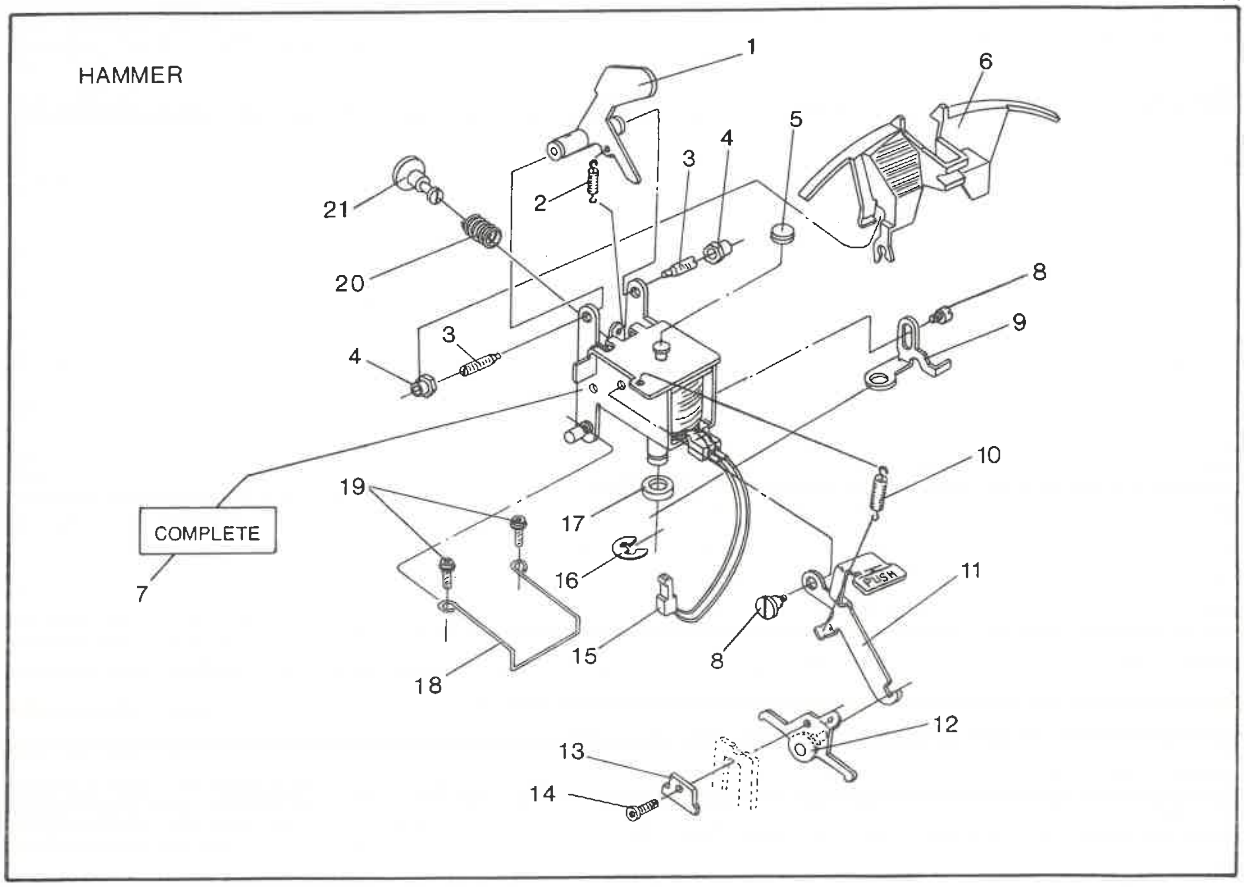


REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	740111	Ribbon Feed Spring	1	12	780286	Ribbon Drive Solenoid	1
2	781725	Ribbon Feed Tubing	1	13	770298	Wire Strap	1
3	770290	Ribbon Feed Assembly	1	14	747258	Screw	1
4	467980	Retaining Ring	1	15	770285	Black Feed Pawl Latch	1
5	770295	Correction Stud	1	16	771464	Black Latch Spring	1
6	771411	Ribbon Feed Plunger	1	17	770833	Anti-Backup Feed Spring	1
7	428090	Correction Lift Spring	1	18	770161	Ribbon Feed Shaft	1
8	770294	Correction Lift Bellcrank	1	19	770164	Ribbon Drive Ratchet Hub	1
9	770277	Plunger Return Spring	1	20	749841	Ribbon Driver Spring	1
10	102271	Retaining Ring	1	21	770292	Ribbon Driver	1
11	751055	Screw	2	22	751057	Connector, 2 Pin	1

CASSETTE & CORRECTION RIBBON

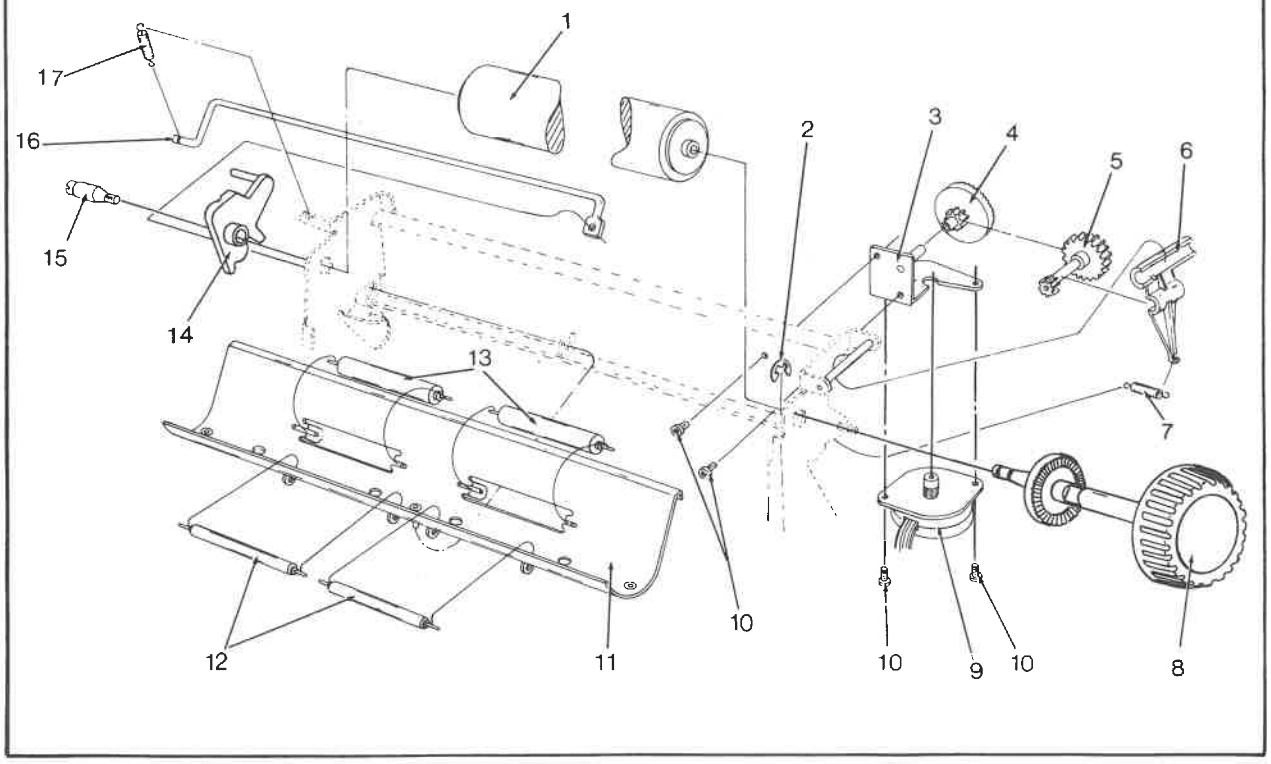


REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	765981	Correction Bail Assembly	1	7	770686	Spring	1
2	771502	Correction Brake Spring	1	8	770288	Correction Feed Pawl	1
3	740108	Correction Spool Hub	1	9	428090	Spring	1
4	749494	Vinyl Tubing	1	10	770291	Cassette Latch	1
5	752247	Screw	1	11	740111	Spring	1
6	770293	Left Correction Arm	1				

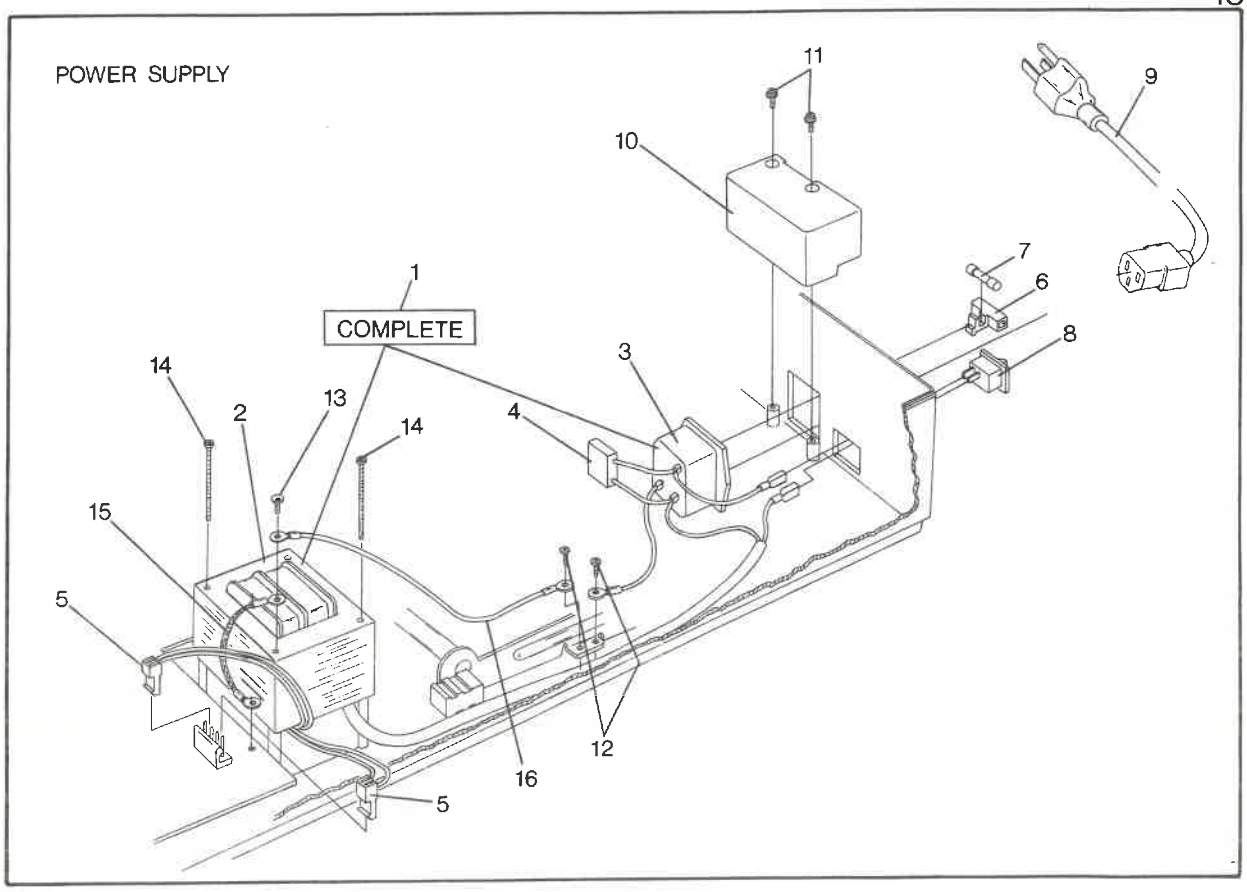


REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	752637	Hammer	1	12	770432	Hammer Plate Assembly	1
2	771795	Hammer Spring	1	13	770280	Hammer Adjustment Washer	1
3	771794	Pivot Screw	2	14	770297	Screw	1
4	770296	Pivot Nut	2	15	751057	Connector, 2 Pin	1
5	772020	Plunger Cap	1	16	771463	E-Ring	1
6	771836	Ribbon Guide	1	17	748562	O-Ring	1
7	771827	Hammer Solenoid Complete	1	18	749789	Hammer Solenoid Retainer	1
8	741510	Screw	2	19	747258	Screw	2
9	770162	Latch Trip	1	20	749734	Pusher Spring	1
10	771419	Hammer Latch Spring	1	21	749735	Printwheel Pusher	1
11	771829	Hammer Latch Lever	1				

PAPER FEED



REF	PART NUMBER	PART NAME	QTY
1	752559	Platen Assembly	1
2	771930	Retaining Ring	1
3	770191	Linespace Bracket	1
4	770165	Pinion Face Gear	1
5	750056	Linespace Pinion	1
6	780000	Linespace Pinion Pivot	1
7	770199	Linespace Pinion Spring	1
8	768121	Platen Knob, Gray, 5DCA	1
8	768120	Platen Knob, Platinum, 5DEA	1
9	770180	Linespace Motor Assembly	1
10	752247	Screw	4
11	748991	Paper Table	1
12	751222	Paper Feed Shaft, Front	2
13	751223	Paper Feed Shaft, Rear	2
14	768108	Paper Release Lever	1
15	768005	Left Platen Shaft	1
16	748995	Paper Release Shaft	1
17	751437	Paper Release Spring	1



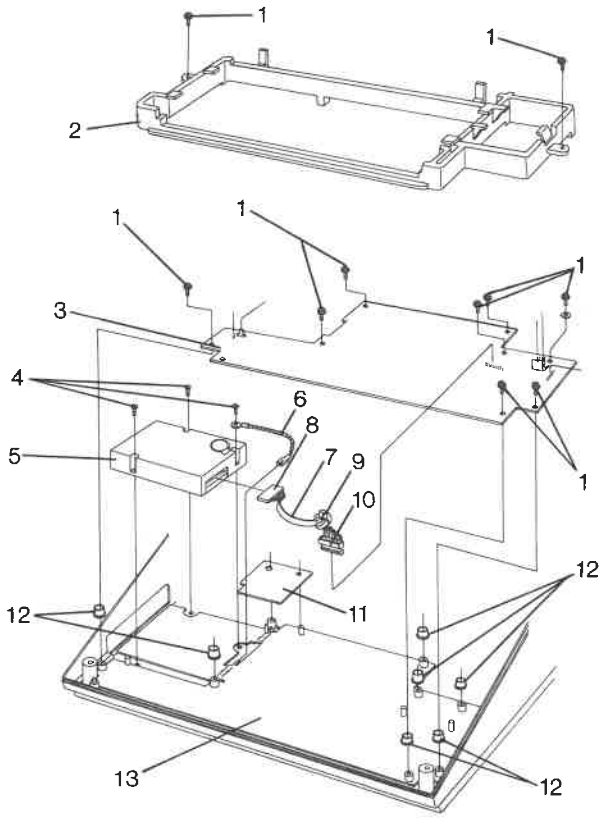
REF	PART NUMBER	PART NAME	QTY
1	768240	AC Power Assembly, (120 V/60 Hz) (W/Ref 2-5)	1
2	768250	Transformer (120 V/60 Hz)	1
3	746035	Appliance Coupler	1
4	746100	Capacitor, 1 uF, 250 VAC	1
5	723356	Connector, 2 Pin	2
6	782215	Fuse Holder	1
7	740437	Fuse (.75 Amp, Slo-Blo, 250V)	1
8	718180	Switch	1
9	525778	Power Cord	1
10	768102	Power Supply Cover	1
11	747258	Screw	2
12	781557	Screw	2
13	781952	Screw	1
14	782219	Screw	2
15	760903	Braided Ground Cable	1
16	765262	Ground Wire	1

INTERNATIONAL POWER SUPPLY PARTS

1	768241*	AC Power Assembly, (240 V/50 Hz) (W/Ref 2-5)	1
2	768251*	Transformer (240 V/50 Hz)	1
9	522551	Power Cord, UK	1

* International AC Power Supplies and Transformers available for sale only to International Distributors.

CONTROL PC BOARD,
DISK DRIVE,
KEYBOARD FRAME



REF	PART NUMBER	PART NAME	QTY
1	747258	Screw	10
2	768000	Keyboard Frame	1
3	768210	Control PC Board	1
4	765120	Screw	3
5	760768	Disk Drive	1
6	760909	Ground Cable	1
7	768303	Disk Drive Cable Assembly, (W/Ref 8-10)	1
8	760802	Connector, 12 Position	1
9	782289	Toroid	1
10	751064	Connector, 12 Position	1
11	768301	Insulator	1
12	768104	Standoff	7
13	768106	Casing Base Shield	1

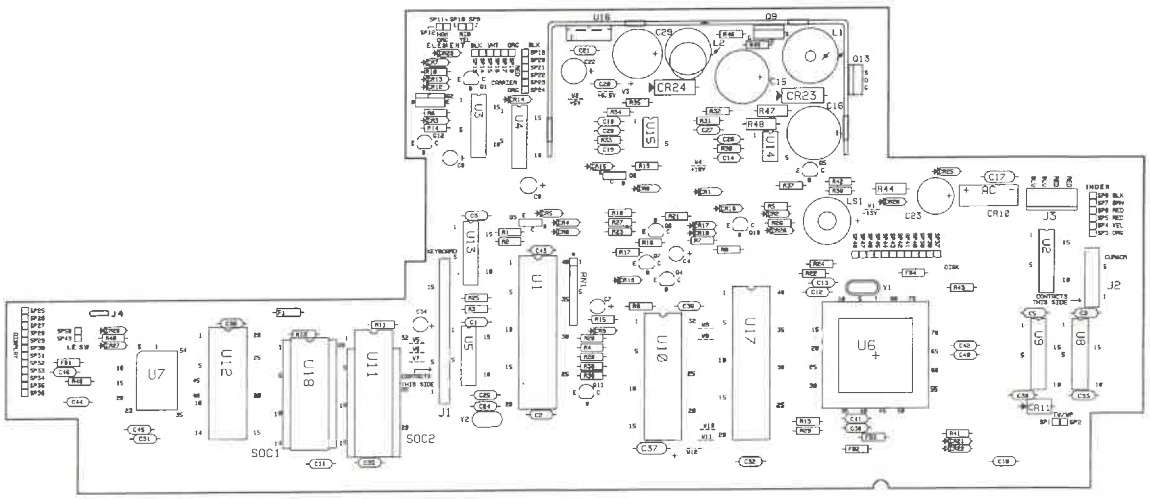
INTERNATIONAL CONTROL PC BOARDS

3	768212	Control PC Board, French Canadian	1
3	768214	Control PC Board, Spanish American	1
3	768215	Control PC Board, United Kingdom	1

CONTROL PC BOARD COMPONENTS

MODELS 5DEA , 5DCA

P/N 768210 US/ENG. CAN.
768212 FR. CAN.
768214 SPAN. A M.
768215 UK

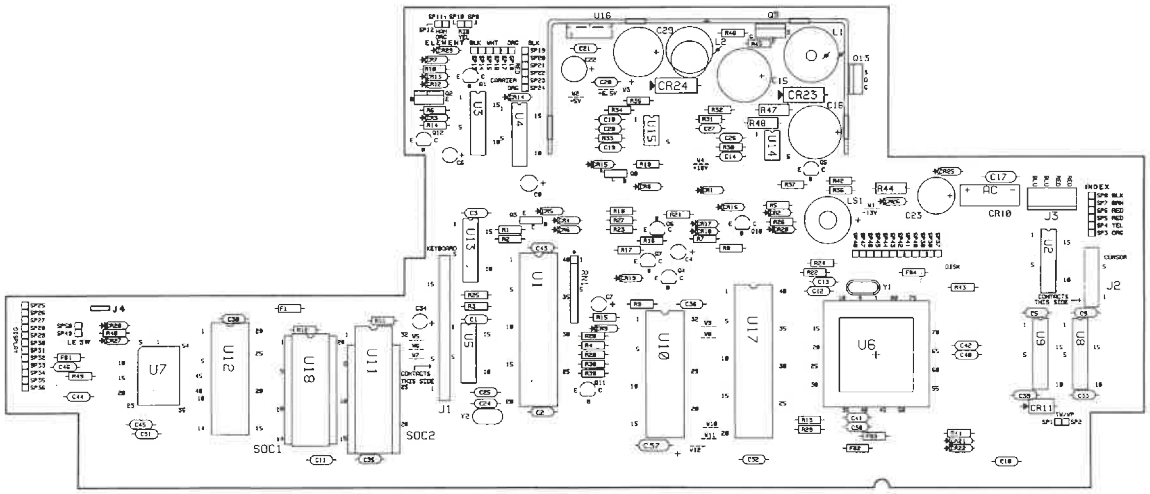


COMPONENT	PART NUMBER	DESCRIPTION
C1, C5, C9, C10, C41-C43, C45, C46	700341	CAPACITOR, AXIAL CERAMIC, .01 uF, 50V
C2, C3, C11, C21, C30-C32, C35, C36	741566	CAPACITOR, AXIAL CERAMIC, .1 uF, 50V
C38, C40, C44		
C4	736101	CAPACITOR, RADIAL ELECT., 47 uF, 25V
C6	736102	CAPACITOR, RADIAL ELECT., 10 uF, 25V
C7, C34	736100	CAPACITOR, RADIAL ELECT., 10 uF, 10V
C8	730017	CAPACITOR, RADIAL ELECT., 1 uF, 100V
C12, C13	700353	CAPACITOR, AXIAL CERAMIC, 10 pF, 100V
C14, C19	741572	CAPACITOR, AXIAL CERAMIC, 1800 pF, 100V
C15	770216	CAPACITOR, RADIAL ELECT., 3300 uF, 25V
C16	770218	CAPACITOR, RADIAL ELECT., 2200 uF, 50V
C17	741558	CAPACITOR, AXIAL CERAMIC, .1 uF, 100V
C18, C27	700360	CAPACITOR, AXIAL CERAMIC, 20 pF, 100V
C20	724673	CAPACITOR, AXIAL TANT., 1 uF, 35V
C22	736105	CAPACITOR, RADIAL ELECT., 470 uF, 6.3V
C23	730030	CAPACITOR, RADIAL ELECT., 470 uF, 35V
C24, C25	700365	CAPACITOR, AXIAL CERAMIC, 30 pF, 100V
C26, C28	700356	CAPACITOR, AXIAL CERAMIC, 2000 pF, 50V
C29	730029	CAPACITOR, RADIAL ELECT., 4700 uF, 10V
C33, C39	741570	CAPACITOR, AXIAL CERAMIC, 33 uF, 50V
C37	700390	CAPACITOR, AXIAL TANT., 10 uF, 10V
CR1, CR15	700521	DIODE, SILICON, 50V, 1N4001
CR2, CR6, CR8, CR9, CR12, CR13,	709100	DIODE, SILICON SWITCHING, 1N914
CR16-CR22, CR27, CR28		
CR3	760817	DIODE, ZENER, 4.3V, 1/2 W, 10%, 1N5991
CR4	781740	DIODE, ZENER, 5.1V, 1.5 W, 1N5918
CR5, CR7	722058	DIODE, FAST RECOVERY, 1 AMP, 1N4933
CR10	734802	DIODE, BRIDGE, 4 AMP, 100V
CR11	760491	DIODE, TRANSORB, 6.8V, P6KE6.8A
CR14	780280	DIODE, ZENER, 5V, 1 W, 1N4733
CR23, CR24	760479	DIODE, SCHOTTKY, 3 AMP, 50V, MBR350
CR25	746184	DIODE, SILICON, 100V, 1N4002
CR26	760792	DIODE, ZENER, 13V, 400mW, 1%, 1N5739D
CR29	765829	DIODE, ZENER, 2.4V, 1/2 W, 10%, 1N5221A

CONTROL PC BOARD COMPONENTS

MODELS 5DEA , 5DCA

P/N 768210 US/ENG. CAN.
768212 FR. CAN.
768214 SPAN. AM.
768215 UK

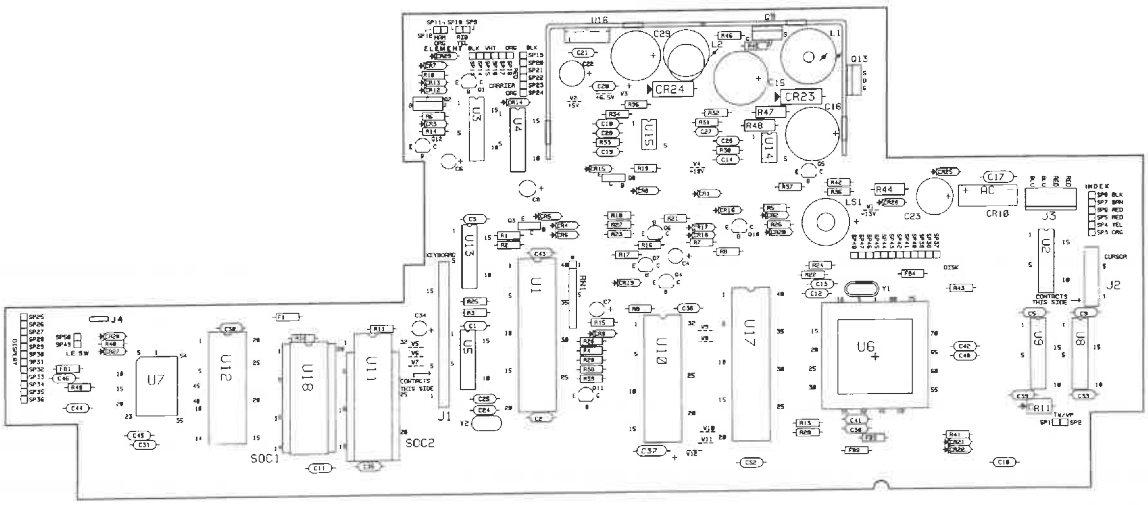


COMPONENT	PART NUMBER	DESCRIPTION
F1	766350	PICO FUSE, .25A, 125 VAC
FB1-FB4	765435	FERRITE BEAD
J1	770150	CONNECTOR, FLEX CABLE, .100 CTRS., 17 POS.
J2	770151	CONNECTOR, FLEX CABLE, .100 CTRS., 6 POS.
J3	723358	POST HEADER, LOCKING, .156 CTRS., 4 POS.
J4	740440	TERMINAL, DISCONNECT, .250 TAB
L1	781560	INDUCTOR, 4 PIN, 270 uH, 6 AMP
L2	760416	INDUCTOR, 50 uH, 3.3 AMP
LS1 (BEEPER)	728783	TRANSDUCER, AUDIO, 12V
Q1, Q4, Q6, Q7, Q10, Q11	702518	TRANSISTOR, NPN, TO-92, 2N3904
Q2	770302	TRANSISTOR, DARLINGTON, NPN, TO-220, 2N6045
Q3	743086	TRANSISTOR, DARLINGTON, NPN, TO-126, 2N6039
Q5, Q12	703714	TRANSISTOR, PNP, TO-92, 2N3906
Q8	740344	TRANSISTOR, DARLINGTON, PNP, TO-126, 2N6035
Q9, Q13	760812	POWER MOSFET, P-CHANNEL, 50V, IRF9Z20
R1, R2	749348	RESISTOR, 180 OHMS, 1/4 W, 5%
R3, R16, R17, R27, R28, R39-R41	701272	RESISTOR, 3.9 K OHMS, 1/4 W, 5%
R4, R8, R29, R43	701279	RESISTOR, 3 K OHMS, 1/4 W, 5%
R5, R45	746938	RESISTOR, 390 OHMS, 1/4 W, 5%
R6	701268	RESISTOR, 10 K OHMS, 1/4 W, 5%
R7, R26, R36	701275	RESISTOR, 22 K OHMS, 1/4 W, 5%
R9, R11, R12, R25	701252	RESISTOR, 220 OHMS, 1/4 W, 5%
R10	781720	RESISTOR, 11 OHMS, 1/4 W, 5%, WIRE WOUND
R13, R20, R49	748225	RESISTOR, 11 OHMS, 1/4 W, 5%
R14	701267	RESISTOR, 2.7 K OHMS, 1/4 W, 5%
R15	701299	RESISTOR, 8.2 K OHMS, 1/4 W, 5%
R18, R19	701280	RESISTOR, 1.8 K OHMS, 1/4 W, 5%
R21, R30, R33	748227	RESISTOR, 220 K OHMS, 1/4 W, 5%
R22, R46	701286	RESISTOR, 820 OHMS, 1/4 W, 5%
R23	701254	RESISTOR, 1 K OHM, 1/4 W, 5%
R24	701269	RESISTOR, 1 M OHM, 1/4 W, 5%
R31, R34	748279	RESISTOR, 10 K OHMS, 1/4 W, 1%
R32	748285	RESISTOR, 170 K OHMS, 1/4 W, 1%
R35	748287	RESISTOR, 56 K OHMS, 1/4 W, 1%
R37	701297	RESISTOR, 5.6 K OHMS, 1/4 W, 5%

CONTROL PC BOARD COMPONENTS

MODELS 5DEA , 5DCA

P/N 768210 US/ENG. CAN.
768212 FR. CAN.
768214 SPAN. A M.
768215 UK



COMPONENT	PART NUMBER	DESCRIPTION
R38	701289	RESISTOR, 510 OHMS, 1/4 W, 5%
R42	701266	RESISTOR, 100 OHMS, 1/4 W, 5%
R44	703722	RESISTOR, 1 K OHM, 1/2 W, 5%
R47	765830	RESISTOR, 390 OHMS, 1/2 W, 5%
R48	765831	RESISTOR, 820 OHMS, 1/2 W, 5%
RN1	752156	RESISTOR NETWORK, 22 K OHMS, 5%, 9 PIN SIP
SP1-SP50	748858	STAKE PIN, .410 LONG X .025 SQUARE
U1	750717	IC, MICROPROCESSOR, SLAVE, 8053 (PROGRAMMED)
U2, U3, U4	781722	IC, QUAD DRIVER, L6220
U5	760754	IC, TTL, DUAL DECODER/DEMUX., 74LS156
U6	761060	IC, ASIC, PWP, 84 PIN, PLCC
U7	761068	IC, LCD CONTROLLER, HD61830B
U8, U9	760511	IC, 64 K X 4 BIT D-RAM, 4464
U10	750718	IC, DICTIONARY, 1 MEG (PROGRAMMED)
U11	750785	IC, EPROM, LOWER ADDRESS BANK, 27512 (PROGRAMMED)
U12	781912	IC, CMOS, 8 K X 8 BIT S-RAM, 6264
U13	770307	IC, QUAD DRIVER, L6221B
U14, U15	770300	IC, VOLTAGE REGULATOR, LM3578
U16	760799	IC, REGULATOR, 5V, SI, 3052V
U17	760486	IC, MICROPROCESSOR MASTER, Z80B
U18	750786	IC, EPROM, UPPER ADDRESS BANK, 27256 (PROGRAMMED)
W1-W4	705294	JUMPER WIRE
W13	752314	RESISTOR, 0 OHMS (5DCA ONLY)
Y1	761067	CRYSTAL, RESONANT, 16.25 MHz
Y2	782200	RESONATOR, CERAMIC, 12 MHz
U10	750667	IC, DICTIONARY, 2 MEG (PROGRAMMED) FR CAN
U10	750713	IC, DICTIONARY, 2 MEG (PROGRAMMED) UK
U10	750719	IC, DICTIONARY, 2 MEG (PROGRAMMED) SPAN AM
U11	750726	IC, EPROM, LOWER ADDRESS BANK, 27512 (PROGRAMMED) FR CAN
U11	750724	IC, EPROM, LOWER ADDRESS BANK, 27512 (PROGRAMMED) UK
U11	750722	IC, EPROM, LOWER ADDRESS BANK, 27512 (PROGRAMMED) SPAN AM
U18	750727	IC, EPROM, UPPER ADDRESS BANK, 27256 (PROGRAMMED) FR CAN
U18	750725	IC, EPROM, UPPER ADDRESS BANK, 27256 (PROGRAMMED) UK
U18	750723	IC, EPROM, UPPER ADDRESS BANK, 27256 (PROGRAMMED) SPAN AM

PART NUMBER	PAGE NUMBER	PART NUMBER	PAGE NUMBER	PART NUMBER	PAGE NUMBER	PART NUMBER	PAGE NUMBER
100200	7	736900	2	749965	8	761050	3
102271	9	740004	8	749967	8	761060	17
105090	8	740084	6	750056	12	761067	17
105100	6	740108	10	750667	17	761068	17
353909	3	740111	9	750713	17	761092	3
364646	7	740111	10	750717	17	765000	4
428090	9	740143	8	750718	17	765110	3
428090	10	740257	6	750719	17	765111	3
439272	7	740344	16	750722	17	765120	14
467980	8	740437	13	750723	17	765131	2
467980	9	740440	16	750724	17	765160	2
522551	13	741374	7	750725	17	765161	2
525778	13	741510	11	750726	17	765262	13
700341	15	741558	15	750727	17	765435	16
700353	15	741566	15	750785	17	765828	3
700356	15	741570	15	750786	17	765829	15
700360	15	741572	15	751055	9	765830	17
700365	15	742968	4	751057	9	765831	17
700390	15	742970	4	751057	11	765891	2
700521	15	742978	4	751064	3	765981	10
701252	16	743086	16	751064	14	766350	16
701254	16	743088	7	751144	7	768000	14
701266	17	745321	8	751222	12	768004	3
701267	16	745897	8	751223	12	768005	12
701268	16	746035	13	751437	12	768007	3
701269	16	746100	13	751812	6	768020	2
701272	16	746184	15	751817	8	768020	2
701275	16	746938	16	752156	17	768021	2
701279	16	747082	7	752247	10	768021	2
701280	16	747258	2	752247	12	768022	2
701286	16	747258	7	752314	17	768050	2
701289	17	747258	8	752559	12	768051	2
701297	16	747258	9	752637	11	768060	3
701299	16	747258	11	752734	8	768061	3
702518	16	747258	13	752735	8	768070	3
703714	16	747258	14	758456	4	768071	3
703722	17	748050	12	760416	16	768090	2
705294	17	748225	16	760479	15	768091	2
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718180	13	748279	16	760491	15	768104	14
722058	15	748285	16	760511	17	768105	3
723356	13	748287	16	760754	17	768106	14
723358	16	748366	6	760768	14	768107	2
724673	15	748366	7	760792	15	768108	12
728783	16	748562	11	760799	17	768109	2
729572	2	748858	17	760802	14	768120	12
730017	15	748995	12	760804	3	768121	12
730029	15	749348	16	760812	16	768130	2
730030	15	749494	10	760817	15	768131	2
734802	15	749734	11	760883	3	768140	3
736100	15	749735	11	760903	13	768141	3
736101	15	749789	11	760908	4	768150	2
736102	15	749841	9	760909	14	768151	2
736105	15	749961	8	761050	3	768160	2

PART NUMBER	PAGE NUMBER
768161	2
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768307	6
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781560	16
781720	16
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781740	15
781890	2
781912	17
781952	13
781996	2
781997	2
781998	2
782200	17
782215	13
782219	13
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SMITH CORONA

5D SERIES
Personal Word Processors

PWP 2000 (5DEB)
PWP 3 (5DCB)
Mark X PWP (5DWA)
PWP 55D (5DDA)
PWP X15 (5DSA)
Deville PWP 3 (5DKA)

PARTS MANUAL

Printed in U.S.A. Form 3-0775
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PREFACE

This comprehensive Parts Manual lists and illustrates parts and electronic components necessary for the maintenance of the following Smith Corona 5D Series Personal Word Processors:

Model Prefix	Model Name	Color	Model Prefix	Model Name	Color
5DCB	PWP 3	Silver Fog	5DEB	PWP 2000	Platinum
5DSA	PWP X15	Silver Fog	5DDA	PWP 55D	Platinum
5DWA	Mark X PWP	Silver Fog	5DKA	Deville PWP 3	Silver Fog

Unique International parts are listed separately on each page where applicable. All Keybuttons are listed on the same page with a country designator after the item description -- see the Keyboard Codes at the top of each page for Color and Country.

A Reference Number is used on parts illustrations, and a Component Number is used for each Component on the Control PC Board diagrams. The number is listed numerically in the parts listing beneath the illustration or diagram, and refers directly to the part number.

When an illustrated part has variations in appearance, color, voltage, etc., the reference number appears more than once in the "REF" or "COMPONENT" column. Use extreme care in selecting parts in these areas.

If the part number is known, the page on which it is listed can readily be found by reference to the numerical parts listing at the end of the Manual.

Ordering Instructions: State the correct part number on all parts orders. State additional information if asked for. It is not necessary to state the part name unless the part number is not known. Do not order by reference numbers.

NOTICE

Smith Corona encourages PC Board repair by qualified technicians. If, however, after trying to repair a PC Board, the Board still does not work properly, return the Board to Smith Corona National Service Stores for warranty or repair exchange.

Important: Smith Corona does not replace or exchange damaged PC Boards (in or out of warranty).

Boards will be returned as irreparable and no credits or exchanges issued when:

- There are missing components
- There are damaged or lifted traces
- There are solder burns
- There is any other Board damage which makes the Board irreparable

Smith Corona reserves the right to discontinue parts at any time and/or to furnish substitutes.

1. MASK/LCD ASSEMBLY REMOVAL

1) Remove four SCREWS (3).

2) Lift right side of MASK (1) slightly and disconnect Mode SWITCH CONNECTOR (2) from Control PC Board.

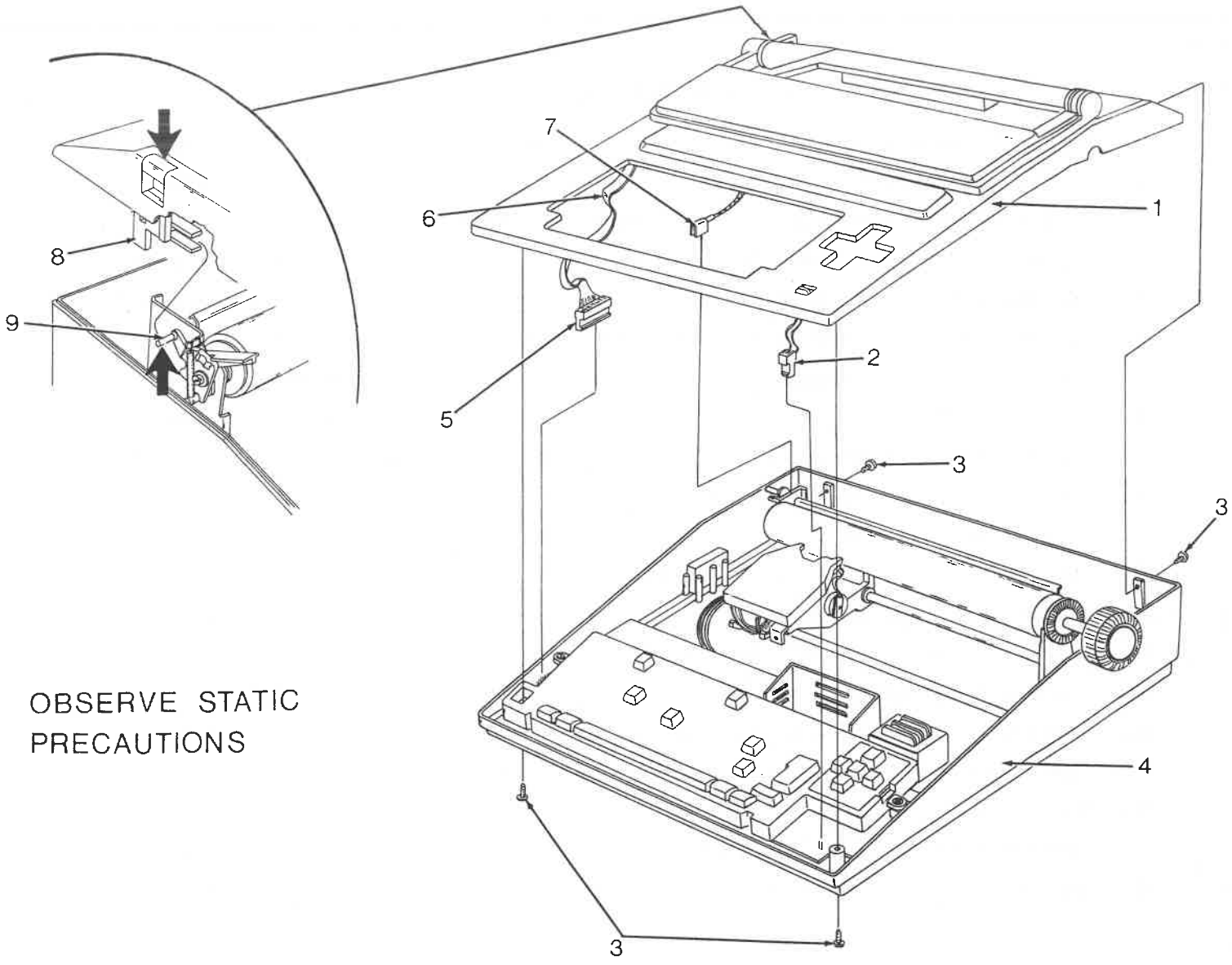
3) Raise left front of Mask and remove LCD CONNECTOR (5) from Control PC Board.

4) Move MASK (1) upward and rearward to disengage PAPER RELEASE LEVER (9) from PAPER RELEASE ACTUATOR (8). (See insert).

5) Pivot right side of Mask Assembly off to the left. Disconnect the LCD GROUND WIRE (7) from Frame Assembly. Lift LCD CABLE (6) from Casing Base and lift off Mask. NOTE 1: Deck and Paper Bail can be unsnapped from Mask. NOTE 2: To remove CASING BASE (4), remove Keyboard Frame Assembly, Frame, Control PC Board, Disk Drive, and Power Supply (see Removals Index).

REPLACEMENT:

Reverse procedure. NOTE: Before replacing MASK (1), push PAPER RELEASE ACTUATOR (8) down and lift PAPER RELEASE LEVER (9) up to assure easy alignment of the Lever Stud into the Actuator Fork.



OBSERVE STATIC PRECAUTIONS

SECTION 4

REMOVALS

GENERAL PROCEDURE: All removals should be performed with power cord unplugged and machine at rest.

Prior removal of particular groups of parts is indicated in each removal procedure as required.

Adjustments broken during a removal are indicated at the bottom of each procedure, and are referenced to adjustment numbers in the Adjustment Section. Refer to the Branch Display on page 5-1 for sequential relationships among adjustments.

OBSERVE STATIC PRECAUTIONS

Removals of PC Boards and other static sensitive parts are marked as above. Be extremely careful when handling these parts as static electricity can cause irreparable damage to static sensitive devices. Refer to the reverse side of the Contents page (page ii) for proper procedures to follow when handling static sensitive devices.

REMOVALS INDEX

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2. Keyboard, and Cursor Keypad Removal ---------- 4-3
3. Cursor Keypad Keyswitch Plunger Removal ---------- 4-3
4. Keyboard Component Removals ---------- 4-4 & 4-5
5. LCD and LCD Housing Removal ---------- 4-6 & 4-7
6. LCD Housing Brake Assembly Removal ---------- 4-6 & 4-7
7. Control PC Board Removal ---------- 4-8
8. Disk Drive Removal ---------- 4-8
9. Frame Assembly Removal (with Carrier & Paper Handling) --------- 4-9
10. Power Supply Removal ---------- 4-10
11. Correction Bail Removal ---------- 4-11
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13. Ribbon Mechanism Removal ---------- 4-12
14. Hammer Solenoid Assembly Removal ---------- 4-13
15. Element Motor Removal ---------- 4-13
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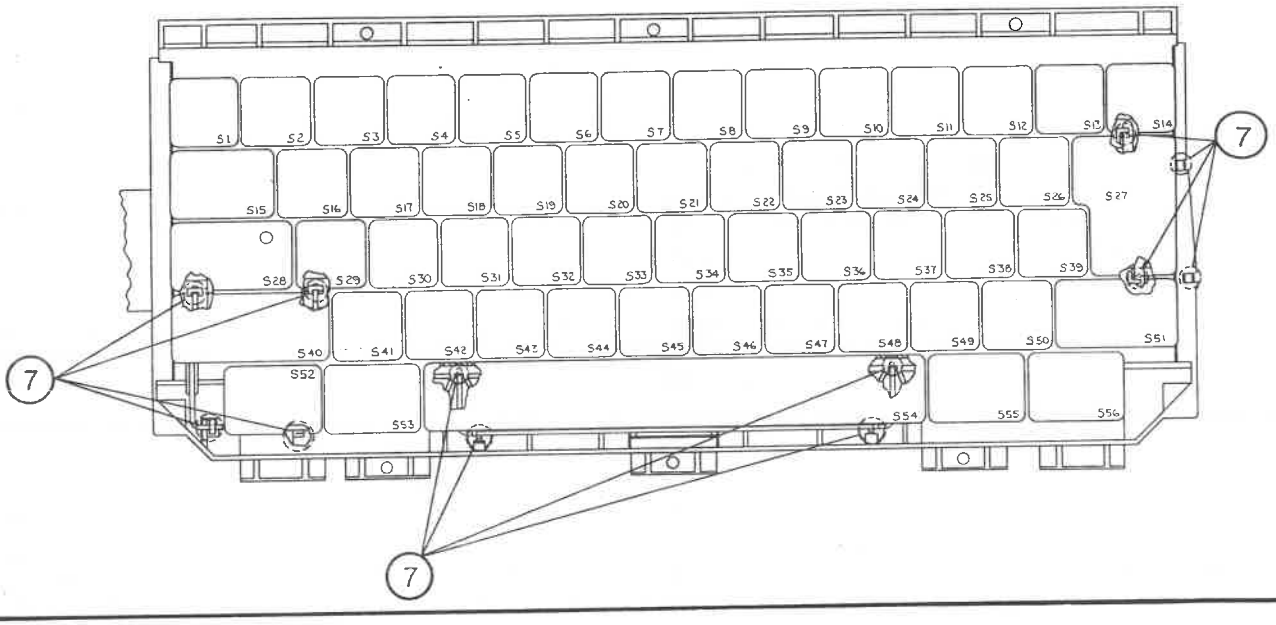
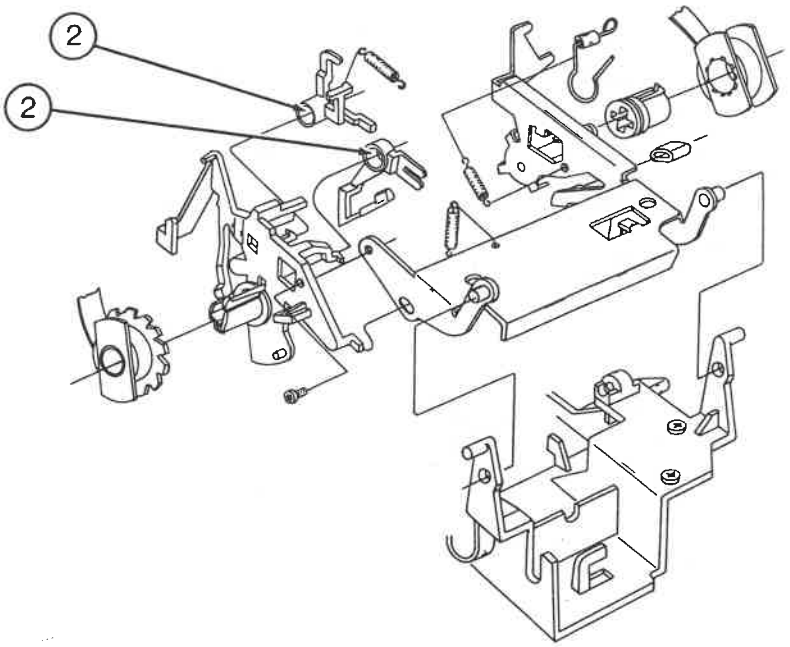
19. Carrier Motor and Carrier Capstan/Cable Assembly Removal ------- 4-16 & 4-17
20. Carrier Molding Removal ---------- 4-18

LUBRICATION POINTS

KEYBOARD



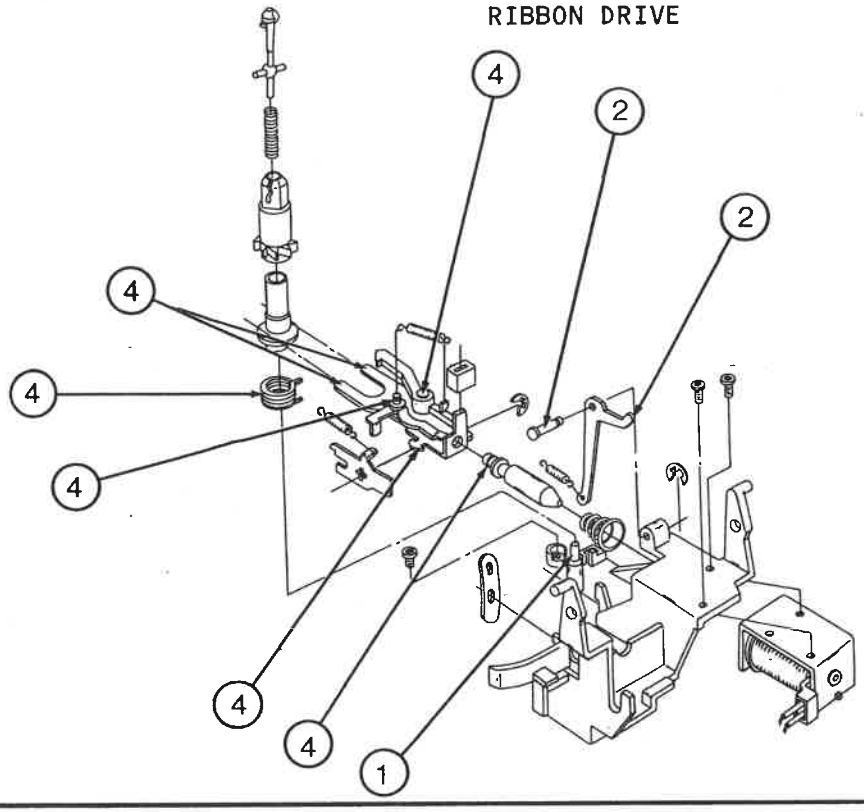
CORRECTION LIFT/FEED



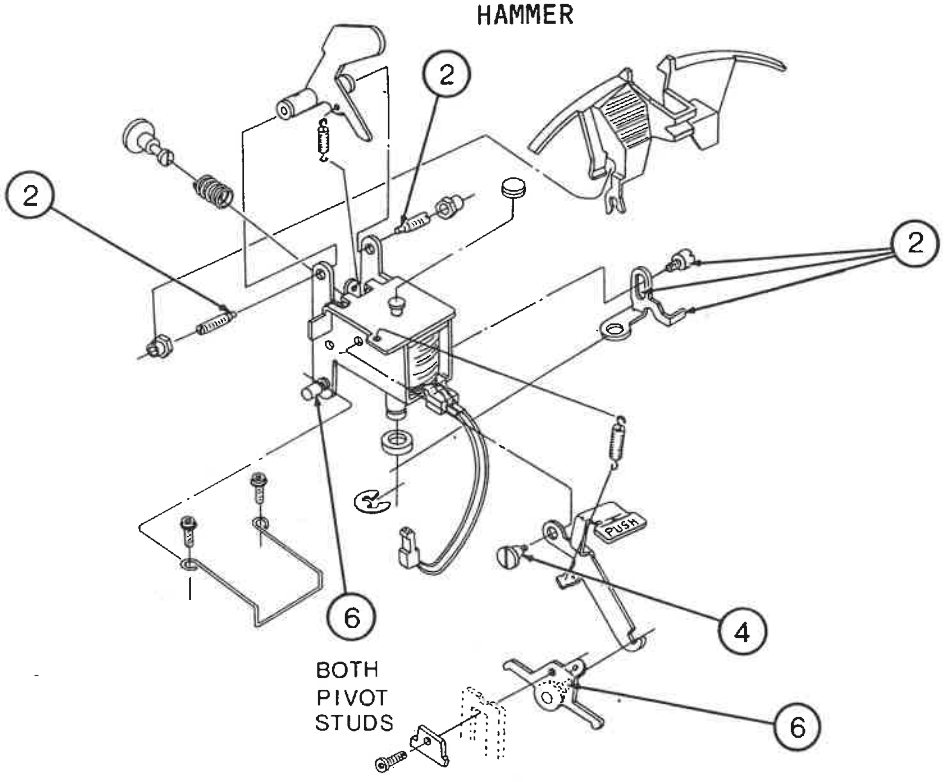
REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

LUBRICATION POINTS

RIBBON DRIVE



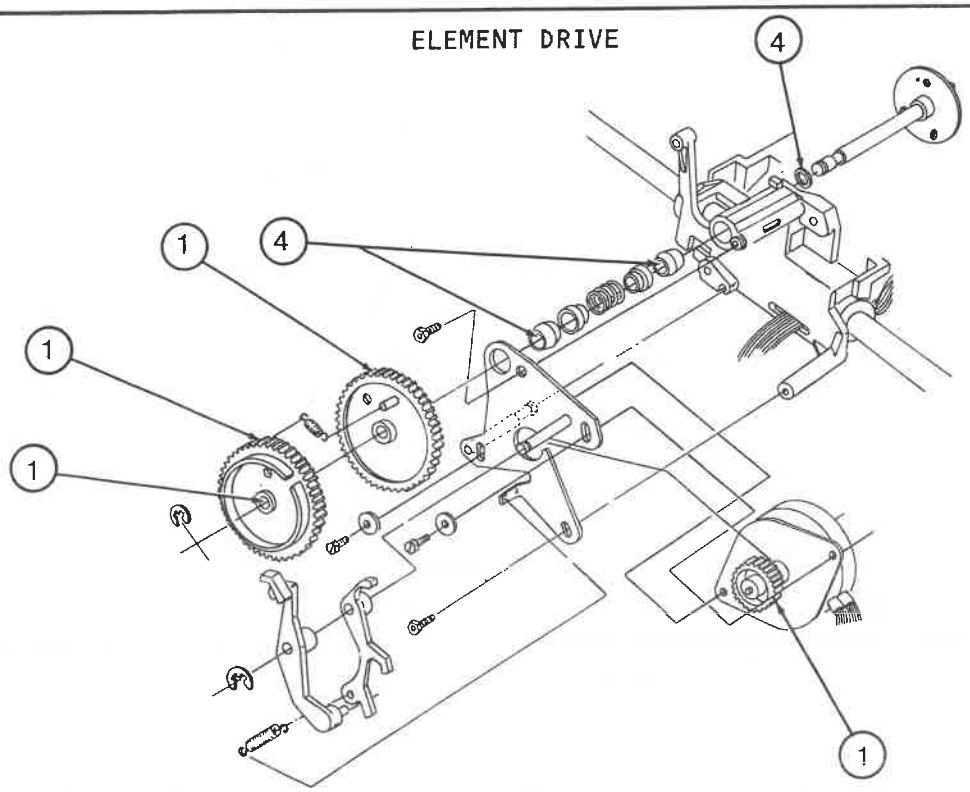
HAMMER



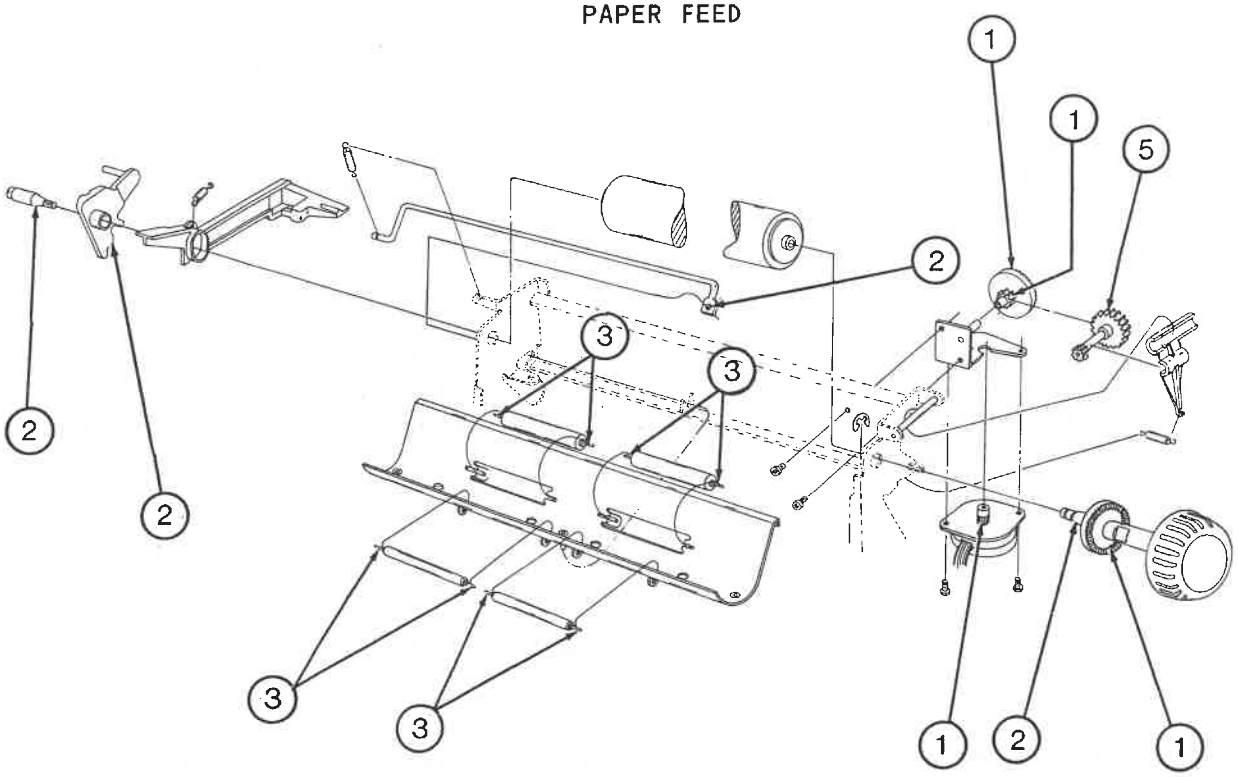
REF	DESCRIPTION	REF	DESCRIPTION
1	Dow #200 Silicone	4	Anderol 465
2	VW-1222 Grease	5	Dow #111 Silicone
3	Mobil FM2 Grease	6	Never-Seez Grease
		7	Nyogel

LUBRICATION POINTS

ELEMENT DRIVE



PAPER FEED

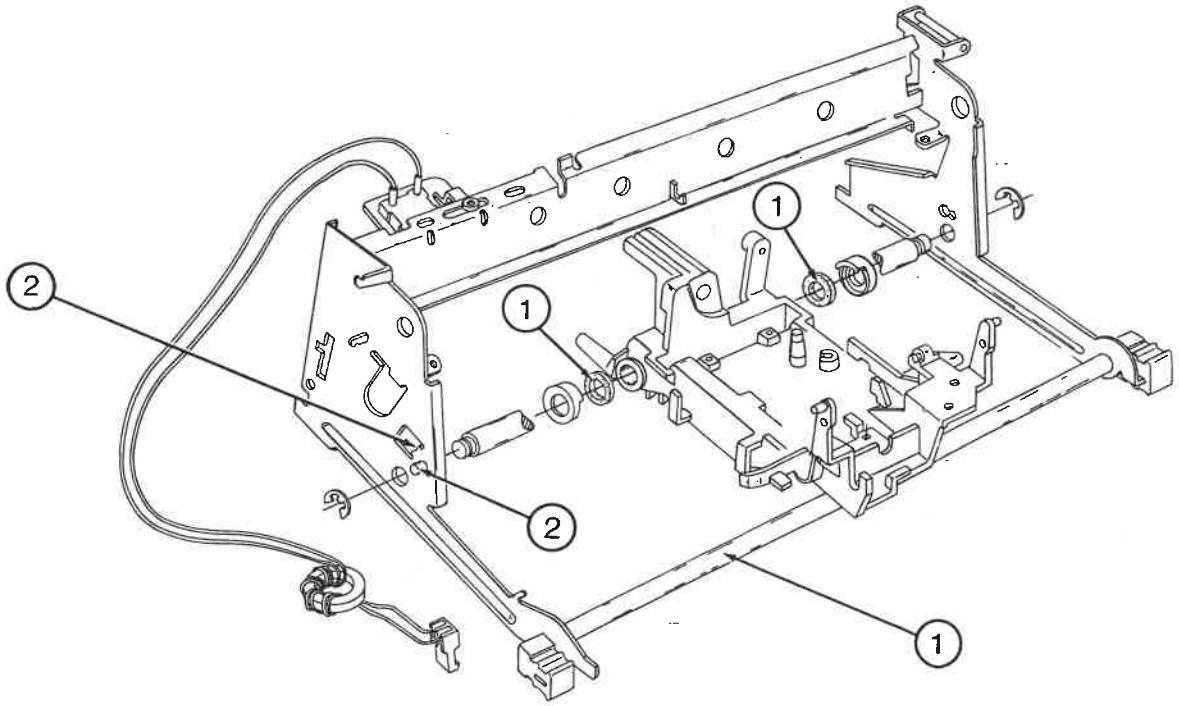


REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease

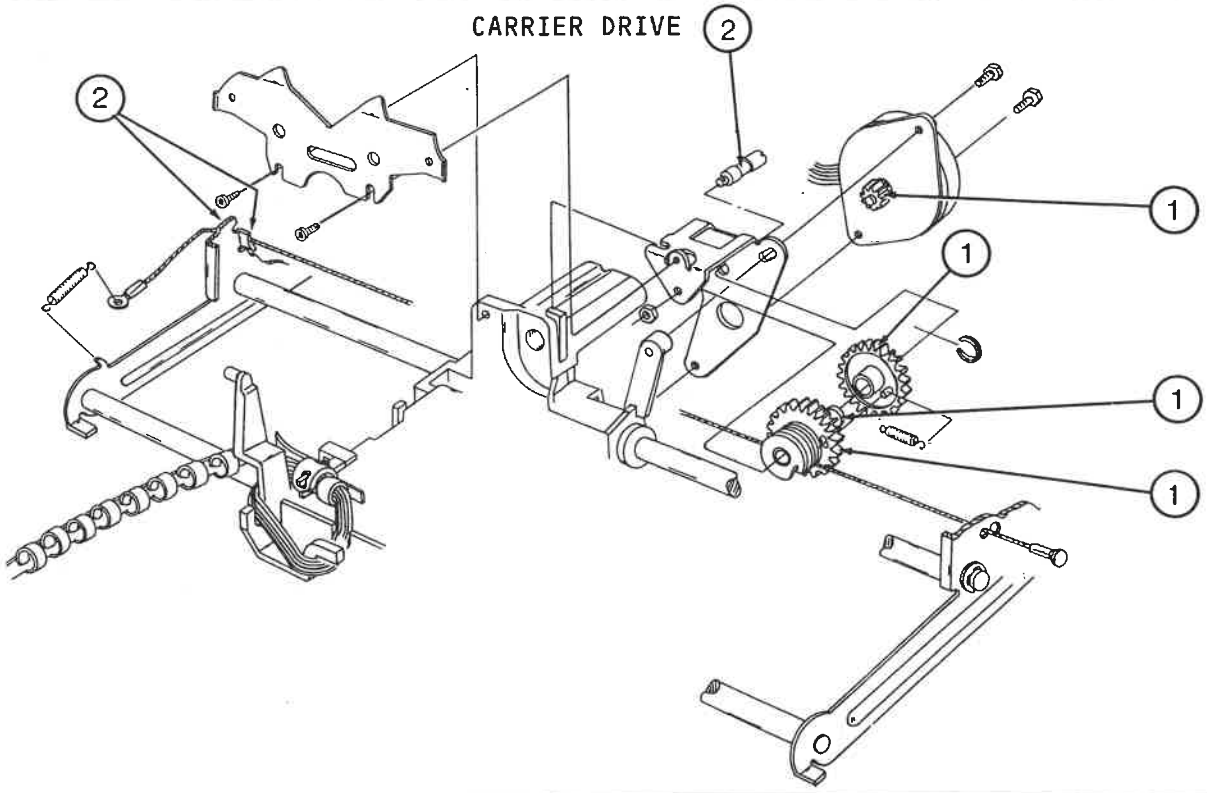
REF	DESCRIPTION
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

LUBRICATION POINTS

CARRIER RAILS



CARRIER DRIVE



REF	DESCRIPTION
1	Dow #200 Silicone
2	VW-1222 Grease
3	Mobil FM2 Grease
4	Anderol 465
5	Dow #111 Silicone
6	Never-Seez Grease
7	Nyogel

CLEANING PROCEDURES

Cleaning procedures for machine parts and recommended cleaning solutions are outlined below.

DO NOT, under any circumstances, use an air hose or chemical cleaner to clean an Electronic Typewriter. Debris and chemical residue can impair the function of electrical components. If an internal part requires cleaning, wipe that part clean with clean, dry cloth.

CAUTION: WHEN CLEANING WITH RECOMMENDED CLEANING SOLUTIONS, TAKE CARE THAT NO LIQUID DRIPS OR SPLASHES ONTO INTERNAL PARTS. KEEP ALL SOLVENTS AND PETROLEUM DISTILLATES AWAY FROM ELECTRICAL COMPONENTS.

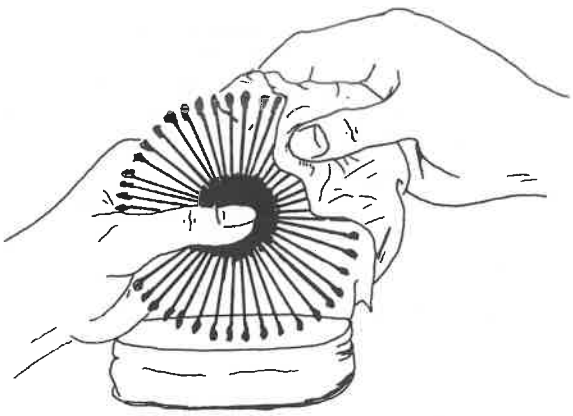
PLATEN

Remove Platen (see Removals). Soak a clean cloth with rubbing alcohol, and wipe the Platen surface to remove dust, dirt, and ink.

NOTE: If Platen is not removed, do not use alcohol: use a household cleaner such as Windex.

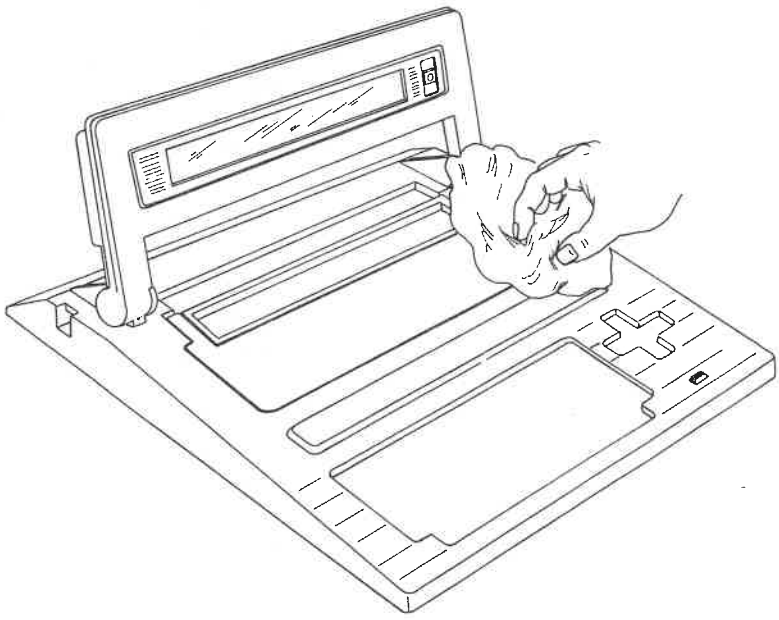
PRINT ELEMENT

Dip the Print Element Petals into a container of rubbing alcohol, and wipe dry with a clean cloth. DO NOT soak the Print Element in the alcohol.



JACKETS

Remove Jackets and wipe clean with a sponge soaked in a mild ammonia or soap solution. DO NOT use any cleaning solutions which contain chlorinated compounds.



LCD

Use a soft camel hair artist's brush to remove dust. Use a soft dry cloth to remove smudges. DO NOT allow any liquid to come in contact with the LCD.

SECTION 3

LUBRICATION & CLEANING

LUBRICATION & CLEANING INDEX

SUBJECT	PAGE
GENERAL LUBRICATION PROCEDURE	3-1
CLEANING PROCEDURES	3-2
LUBRICATION POINTS	3-3

GENERAL LUBRICATION PROCEDURE

The main illustration points for 5D Series Personal Word Processors are illustrated and listed beginning on page 3-3. Each lubrication point is indicated with an arrow and a circled reference number indicates the lubricant used at that point. The following lubricants are required:

REFERENCE NUMBER	DESCRIPTION	PART NUMBER
1	Dow #200 Silicone	250254
2	VW-1222 Non-Fluid Oil	250299
3	Mobil FM2 Grease	250500
4	Anderol 465	250289
5	Dow #111 Silicone	250290
6	Never-Seez Grease	250293
7	NYOGEL	250262

IMPORTANT: The following parts should be kept free of dirt, grease, and oil:

Control PC Board
Transformer
Disk Drive
LCD

12) CASSETTE RIBBON FEED MECHANISM

When latched for Cassette Ribbon feed, the Cassette Ribbon Feed mechanism feeds Ribbon when the Ribbon Solenoid is energized. The top of the Ribbon Driver seats in the Drive Gear in the Ribbon Cassette. The bottom of the Ribbon Driver seats into the Ribbon Ratchet Hub which in turn fits over the Ribbon Feed Shaft. On the bottom of Ribbon Feed Shaft is an Anti Backup Feed Spring which allows the Feed Shaft to rotate only in one direction.

After printing the previous character, the Ribbon Solenoid energizes and pulls the pawl of the Ribbon Feed Assembly in the teeth of the Ribbon Drive Ratchet Hub. This action rotates the Ribbon Feed Shaft, which rotates the Ribbon Driver approximately 30° for each printable character. The Cassette Ribbon is now positioned for the next printable character.

13) CORRECTION LIFT & FEED MECHANISM

When the Ribbon mechanism is in its normal position, it is ready for a Correction Lift and Feed cycle. As the Ribbon Solenoid plunger is pulled into the Solenoid, the bottom of the Correction Bellcrank is pulled forward, moving the top tail upward, which causes the Correction Bail to lift upward. As the Bail raises, the Correction Feed Pawl ratchets over one tooth of the Correction Take-up Spool. When the Ribbon Solenoid Plunger is released, spring tension on the Bail returns all parts to rest. As the Bail lowers, the Feed Pawl engages a tooth in the Correction Take-up Spool to rotate the Take-up Spool one tooth past the Stop-Pawl to feed the Correction Ribbon.

14) PAPER FEED

Driven by the Electronics, the Index Motor rotates clockwise and counter-clockwise to drive the Platen for Paper Feed.

On the Index Motor is a 12 tooth Drive Gear that is permanently attached to the Index Motor Rotor Shaft. This Gear is in mesh with a Pinion Face Gear. The Pinion Face Gear has a smaller gear that meshes with a large gear of the Linespace Pinion Assembly. The Linespace Pinion Assembly has a small gear that is in mesh with the Gear surface of the Platen Knob Assembly. The Platen Knob is mechanically attached to the Platen. This series of gears provide the correct gear speed and torque to provide proper rotation of the platen.

When the Carrier Return Keybutton or Code function is depressed, the Electronics energizes the Index Motor to rotate the Platen the number of linespaces as determined by the operator's linespace selection (1, 1 1/2, or 2).

The Paper Release Lever holds the Paper Table so that Front and Rear Feed Rollers are against the bottom of the Platen to provide Paper Feed through friction when the Platen rotates. When the Paper Release Lever is pulled upward, the Paper Table drops slightly to remove the Feed Roller tension, which allows the operator to straighten a sheet of paper before printing.

11) CASSETTE RIBBON FEED/CORRECTION RIBBON LIFT & FEED

The Cassette Ribbon Feed and Correction Ribbon Lift & Feed are both driven by the same mechanism. This mechanism has one solenoid which is energized every Cassette Ribbon or Correction Ribbon cycle. A latching system, controlled by the energizing of the Print Hammer Solenoid, triggers either a Cassette Ribbon Feed or a Correction Lift and Feed. The normal position of this latch mechanism is Correction Lift and Feed.

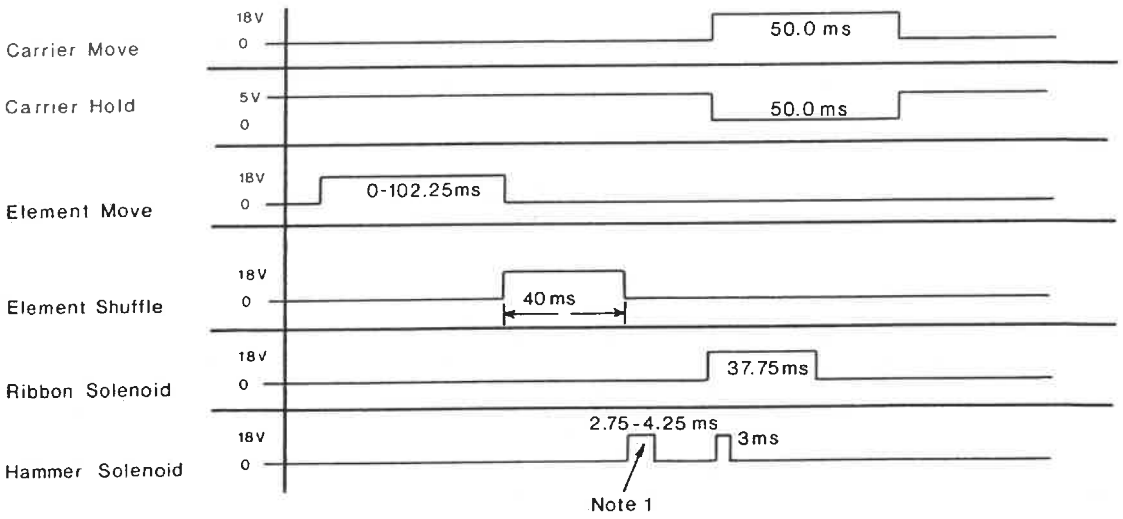
The Electronics determines from Keybutton depressed whether the feed should be Cassette Ribbon or Correction Ribbon. A brief sequence for each action follows:

A) CASSETTE RIBBON - the Element rotates to the selected character; the Hammer fires to print the character and trip the Ribbon mechanism for a Cassette Ribbon Feed; the Ribbon Solenoid energizes to feed the Cassette Ribbon; the Carrier moves right one space (see Print Cycle Chart below).

NOTES: 1) When the Ribbon Solenoid is de-energized, the Ribbon mechanism returns to the Correction Lift and Feed position.
2) The Ribbon advance during a Cassette Ribbon cycle is for the next printable character.

B) CORRECTION LIFT & FEED - the Carrier moves left to the character location; the Element rotates to the selected character; the Ribbon Solenoid energizes to lift and feed the Correction Ribbon, and the Hammer fires to transfer the character to the Correction Ribbon. The Ribbon Solenoid de-energizes, allowing the Correction Bail to drop to its normal position and the Ribbon mechanism to the Correction Lift and Feed position.

PRINT CYCLE - SINGLE CHARACTER (10 PITCH)



NOTE 1:
LENGTH OF PULSE VARIES
WITH THE PITCH SELECTED
AND HAMMER ENERGY LEVEL.

8) CARRIER DRIVE (continued)

The forward half of the Carrier Scissors Gear is part of the Carrier Drive Capstan. The Carrier Drive Cable is wound around the Capstan, and anchored in the left and right Carrier Module Frames. When the Carrier Motor rotates clockwise or counterclockwise, the Capstan rotates to move the Carrier left or right along the Carrier Drive Cable.

9) ELEMENT DRIVE

The Element Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Element Motor rotates clockwise and counterclockwise to place the desired character on the Print Element in line with the Hammer for printing and correction.

There is a 48 tooth Drive Gear permanently attached to the Element Rotor Shaft. This Drive Gear is in mesh with a 96 tooth, two piece Element Scissors Gear. The front half of the Element Scissors Gear is pressed onto the Element Drive Shaft, so that when the Element Motor rotates clockwise and counterclockwise the Element Drive Disc rotates also.

The Element Home Positioner and Positioner Actuator are mounted on the rear of the Element Motor Mounting Plate. During initialization, the Positioner Actuator contacts a Stud on the Left Frame, and pivots the Home Positioner so that the Positioner Tooth contacts the ridge on the Rear Scissors Gear. When the Element Motor rotates counterclockwise, the Positioner Tooth drops into the Notch in the Gear Ridge to stop the Element at Home Position.

The Element Drive Disc has two rectangular holes and one round hole which are keyed to fit the Print Element. When a Print Element is inserted, and the Hammer Assembly is pivoted rearward against the Element, the Element Pusher (mounted in the Hammer Solenoid Bracket) pushes the Element against the Drive Disc. During initialization, the Element rotates quickly clockwise to snap the Element onto the keyed holes in the Element Drive Disc under tension of the Element Pusher. The keyed holes assure that the Home Character (e) is at Print Position when the Positioner Tooth is engaged in the Notch on the Rear Scissors Gear.

Element Home Position is established during initialization. If a new Print Element is inserted after initialization, opening and closing the Lid reinitializes the machine to reestablish Home position.

The Electronics is programmed to select the shortest distance to the next printable character on the Element whether printing from the Buffer or starting at Home Position.

10) PRINT HAMMER

The Print Hammer is pivotally attached to the Hammer Assembly Bracket, and rests on the Hammer Solenoid Plunger under spring tension. When the Electronics energizes the Hammer Solenoid for printing, the Solenoid Plunger moves upward to pivot the Hammer top rearward to strike the Print Element Petal in its path against the Platen. When the Hammer Solenoid is de-energized, the Hammer returns to rest under spring tension.

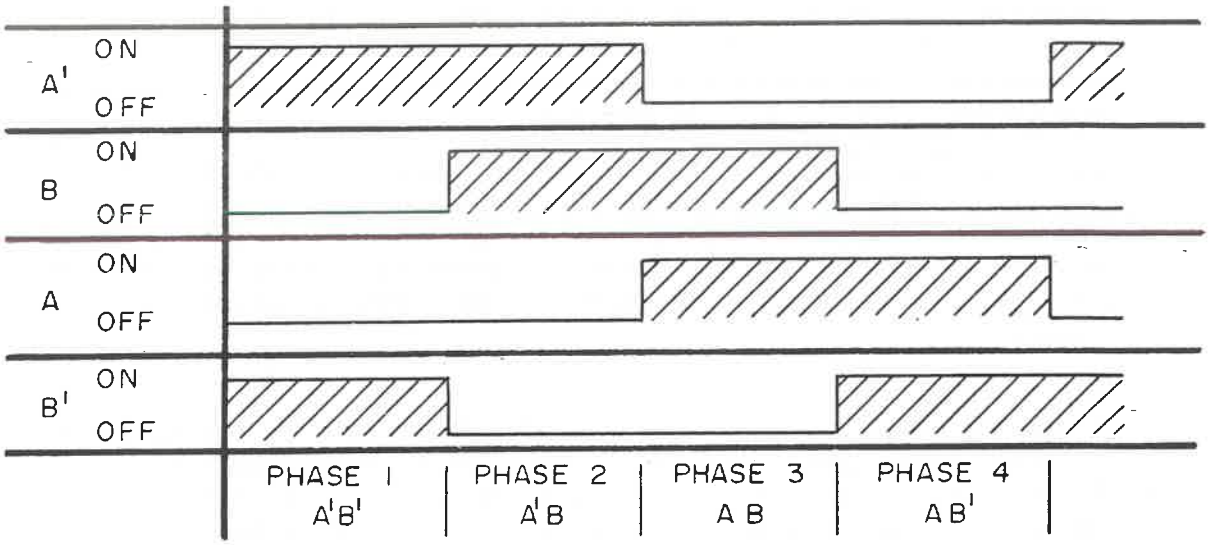
The Electronics is programmed to energize the Hammer Solenoid for longer or shorter periods of time to provide stronger or weaker impression for individual characters. For broad faced characters (W, M, etc.), the Electronics energizes the Solenoid for a longer period of time than for small faced characters (., _, etc.). There are various time periods programmed in the Electronics to provide equal impression among all characters in all pitches.

7) STEPPER MOTORS (continued)

C) STEP ANGLES

The Stator Teeth and magnetic Rotor Poles of each motor are arranged so that each successive Phase that is energized rotates the Rotor the same number of degrees. The step angle for all Motors is 7.5 , which means there are 48 full steps per revolution. The number of phases that are energized to perform any particular function is dependent on the nature of the, function.

STEPPER MOTOR TIMING CHART



8) CARRIER DRIVE

The Carrier Motor is mounted on the rear of the Carrier Molding. Driven by the Electronics, the Carrier Motor rotates clockwise and counterclockwise to move the Carrier left and right along the Carrier Rails for printing, correction, and spacing functions.

There is a 16 tooth Drive Gear permanently attached to the Carrier Motor Rotor Shaft. This Gear is in mesh with a 40 tooth, two piece Scissors Gear. The two halves of the Scissors Gear are held in mesh with the Drive Gear under tension of a Spring assembled between the two halves. This Spring tension eliminates all Gear backlash, which provides improved Gear wear.

7) STEPPER MOTORS

There are three unipolar, four phase, Permanent Magnet Stepper Motors in the machine--the Index, Carrier, and Element Motors.

A) CONSTRUCTION

Each Stepper Motor is made of a radially magnetized Rotor with alternating North and South Poles, and two Stator Sections, A and B.

The Stator Sections each have Bifilar coils wound around a plastic bobbin in the inside diameter of the Stator. When the two Stator Sections are assembled, the teeth of one section are aligned one half tooth away from similar teeth in the other section.

Opposite ends of the Bifilar coils are connected internally and brought out of the stator through a common lead wire. The other end of each coil can be switched to ground through the Electronics. Only one coil of each Bifilar pair is switched to ground at any given time. There are two Bifilar pairs in the stator. The windings in one pair are referred to as A and A', and the windings in the other pair are called B and B'. The direction of current flow is the same in windings A and B, which is opposite to the direction of current flow in A' and B'. The current flowing through the coil creates lines of magnetic flux which charge the Stator Teeth as either North or South Poles. The Stator is constructed so that adjacent teeth are opposite poles when current is flowing through the coil. When current flows in the opposite direction, the polarity of the Stator Teeth changes to attract and repel the poles on the Rotor. Sequentially changing the direction of current flow rotates the Rotor through magnetic attraction and repulsion.

B) DRIVE STRATEGY

The three Stepper Motors make use of different Run, Settle, and Hold voltage levels during operation which are regulated by the Electronics. A run level voltage is applied to the active halves of the coils to produce a strong magnetic field during operation. A settle level voltage is used as a transition voltage when one half of a coil is switched off and the other half switched on. The Carrier Motor also makes use of a third voltage level (Holding Voltage), when stationary, to keep the Carrier stable for printing. The Holding Voltage is drawn off the +18 VDC, and stays between +4 to +5 VDC.

OPERATING VOLTAGES

MOTOR	RUN VOLTAGE	SETTLE VOLTAGE	HOLDING VOLTAGE
Carrier	+18 VDC	+18 VDC	+5 VDC
Element	+18 VDC	+18 VDC	None
Index	+18 VDC	+18 VDC	None

As the Motor Phases change the lines of magnetic flux, the Permanent Magnet Rotor rotates through magnetic attraction and repulsion. The Electronics reverses the phase sequence for reverse Rotor rotation.
NOTE: The terms "Phase 1," "Phase 2," etc., are used for description purposes only. The actual starting phase for any motor move is dependent upon where the motor stopped in its previous move, and on the programming in the Electronics. All subsequent motor steps follow the normal sequence. The starting phase for the Carrier Motor is dependent upon the pitch selected and the Left End Switch Adjustments.

5) LIQUID CRYSTAL DISPLAY

The Liquid Crystal Display (LCD) is an 80 columns (characters) wide by 7 lines high electronic dot display. Each character is 5 dots wide by 7 dots high. The color of the display is Silver Tone with dark blue/violet dots. The programming for the lines on the display is such that a blank dot appears between lines for clear readability. The LCD requires +5 VDC and -13 VDC to operate. Electronic data is sent from the Control PC Board to the LCD. Electronic drivers on the LCD turn on the required dots to form each individual character. The contrast of the characters formed in the Display is regulated by the Contrast control. This control is a sliding potentiometer that in effect varies the -13 VDC from -13 VDC to 0 VDC.

Behind the LCD is an Electro-Luminescent (EL) Back Light Panel. This panel provides back lighting for the LCD, which allows easy readability of the LCD in low light environments. The EL Panel operates on 120 VAC which is provided by a DC/AC Inverter. The input to the Inverter is +18 VDC and the output is 120 VAC @ 600 Hz.

6) DISK DRIVE

The Disk Drive is a single track spiral drive capable of storing and retrieving data from a 3 inch double sided, double density, single track storage disk. The Disk Drive requires +5 VDC for Logic Voltage and +6.5 VDC for Disk Drive Motor Voltage. The Disk Drive prepares (formats) the disk into 50 1K sectors (excluding the Directory). This allows 50K of text storage in a maximum of 10 files for each side of the disk for a total of 100K of text in up to 20 files per disk.

Normal rest position for the Head of the Disk Drive is near the end of the inside edge of the disk storage area. When a file is recalled or stored, the Disk Drive rotates and the head moves briefly toward the inside edge then quickly to the outside edge of the disk. It continues until it again reaches the rest position and Head and Disk Drive motor movement stops. This rest position allows the disk to be up to operating speed by the time the Head moves to the outside edge where the Directory information is stored. Once the Directory information is stored or read, then the head passes over an area where text is stored or read. Movement continues until rest position is reached once more.

The Control PC Board provides electronic data, power voltages, and communications to the Disk Drive through the ASIC chip When information is stored on the disk, the ASIC internally converts Parallel data to Serial data. The Serial information is then processed internally by the Disk Controller which converts this Serial information to a Modified Frequency Modulation (MFM) signal. This MFM signal is then sent to the Electronics of the Disk Drive for processing and text storage to the disk. The opposite sequence occurs when information is read from the disk and sent to the ASIC chip.

4) ELECTRONICS (continued)

The Z80 Microprocessor sends and receives information to the LCD Controller, ASIC, Operating ROM, and Motor Controller (8053) Microprocessor. The Z80 and 8053 constantly communicate with each other in order to maintain proper timing and keep the operating functions in proper sequence so everything runs smoothly.

The Applications Specific Integrated Circuit (ASIC) is a state of the art (84 pin) integrated circuit. Basically, it is an Address Decoder, USART, and Frequency Divider which performs the following functions:

A) Disk Controller -- controls the data flow to and from the Disk Drive.

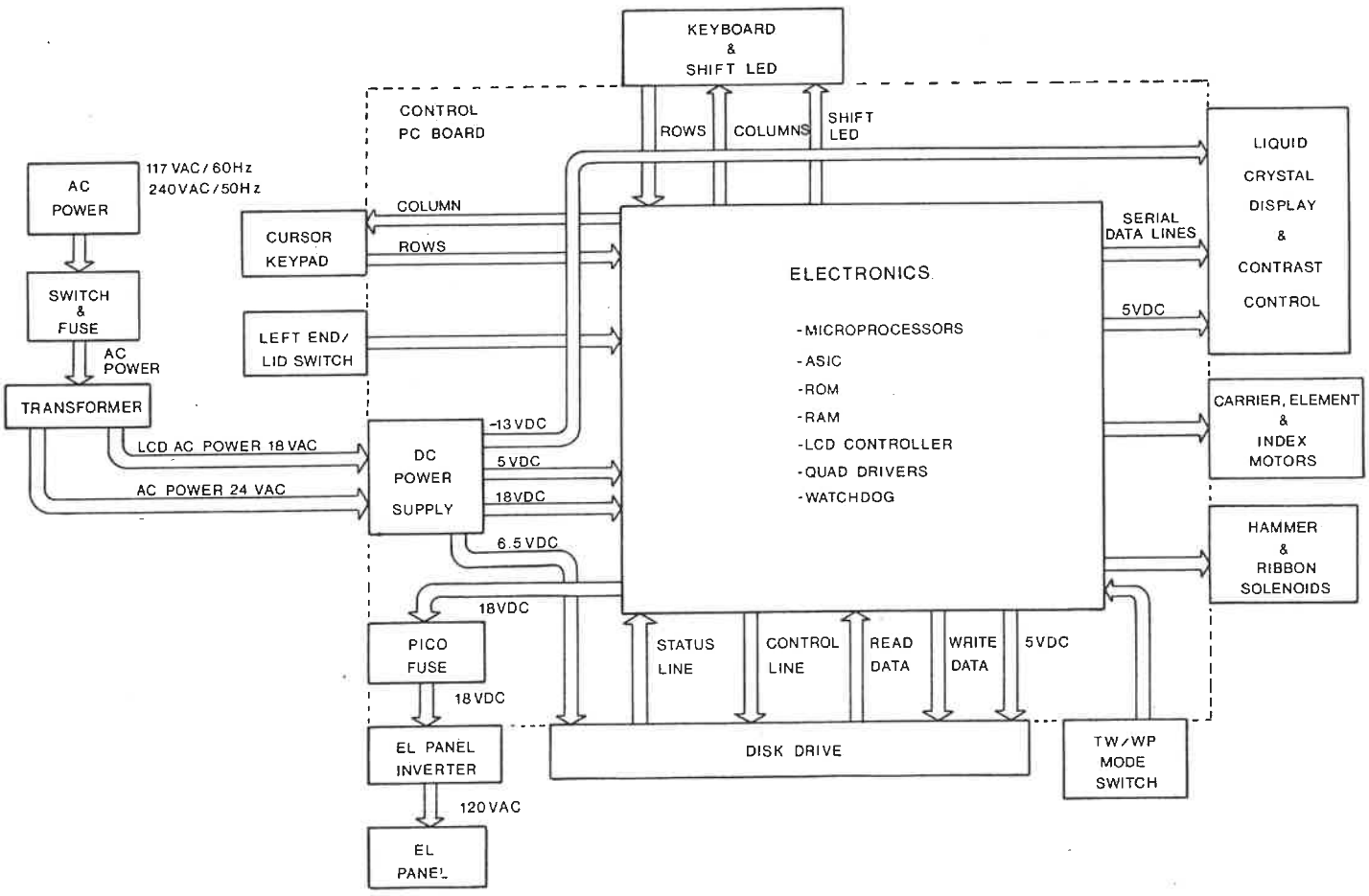
B) RAM Controller -- insures that the RAM is refreshed and has to choose whether to read the RAM or the ROM.

C) ROM Controller -- controls the Chip Enable for the different types of program ROM's used.

D) Model Selector -- tells the Z80 the Model (PWP 3 or PWP 40) that the Board hardware is set for.

E) Clock Generator -- produces different Frequency Clock signals from the Main Crystal (12 MHz) that are used by other IC's.

ELECTRONIC BLOCK DIAGRAM



3) KEYBOARD (continued)

A) KEY SCANNING -- The Electronics sequentially pulses Keyboard Columns C6 through C0, every 5ms. Also, the Electronics sequentially pulses the Keypad Column 7, Mode Selector Switch, and Left End Switch every 12.5ms. The Keyboard Rows R0 through R7 and Keypad Rows R0, R1, R4, R5, & R6 are sequentially read by the Electronics.

When a Keybutton is depressed, a circuit is closed in the Keyboard Matrix so that when a pulse appears in that Keybutton's "C" Column, the pulse also appears in the Keybutton's "R" Row. The Electronics determines which Keybutton was depressed by comparing which "C" Column was pulsed at the point in time that the "R" Row became active. If the same "C" Column and "R" Row activity is detected through two scanning cycles, the Electronics interprets this as a valid Keybutton depression and activates the circuits to perform the appropriate function.

When a Keybutton is held down, the Electronics delays 500ms after performing a function to verify that a repeat is desired, and then activates the circuits to continue performing that function until the Keybutton is released.

B) NON-MATRIX KEYBOARD FUNCTIONS -- The Shift Lock LED lights when the Shift Lock Key is depressed. When the LED is on, the electronics performs all printing functions in upper case. When either Shift Keybutton or the Shift Lock Keybutton is subsequently depressed, the Electronics turns the LED off, and printing resumes in lower case.

4) ELECTRONICS

The Control PC Board includes the DC Power Supply, Logic, Power Driver, and Memory (RAM & ROM) circuitry. The functions of the Control PC Board are described below:

The Control PC Board is the heart of the PWP. It provides DC Operating Voltages, controls input data, makes decisions, and controls output data and signals. The Transformer provides separate AC input voltages of 24 VAC and 18 VAC to the Control PC Board. The 24 VAC produces three DC Voltages: +5 volts, +6.5 volts, and +18 volts. The 18 VAC produces one negative DC voltage, which is -13 volts.

Input components to the Control PC Board include Left End/Lid Switch, Mode Selector Switch, Keyboard, Keypad, and Disk Drive.

The two main decision making IC's on the Control PC Board are the Motor Controller (8053) Microprocessor and the Memory Controller (Z80) Microprocessor.

The Motor Controller (8053) Microprocessor responds to commands from the Memory Controller (Z80) Microprocessor and determines which motors and solenoids must be energized to perform a function, and when and for how long they must be energized. The Motor Controller activates the circuits to perform the function, and signals the Memory Controller (Z80) that the function has been performed. The 8053 Monitors the Left End Switch during initialization and during machine operation to check if the switch was closed due to the Deck being raised. Also, the Motor Controller interprets the information it receives from scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch. After interpretation, the Motor Controller reacts and communicates with the Memory Controller (Z80). Finally, the Motor Controller (8053) provides a Reset (ZRESET) to the Memory Controller (Z80) during a power up initialization or a Watchdog time out.

2) INITIALIZATION

The initialization sequence is described in full detail in the troubleshooting section of this manual. Briefly, the sequence is as follows:

A) When power is turned on, the Ribbon Solenoid quickly energizes to insure the Ribbon mechanism is in its proper starting position.

B) The Electronics moves the Carrier slightly to the right, to insure Carrier is not at the Left End Switch and then slightly to the left to insure the Carrier is not at the right end of the machine.

C) The Index Motor Shaft rotates 1/2 forward linespace and then 1/2 reverse linespace to establish a positive writing line.

D) Then, the Element Motor rotates quickly to snap the Element onto the Drive Disc, and then stops.

E) The Carrier moves left until the Element Home Positioner closes the Left End Switch; quickly moves right to open the Switch; left to close the Switch again; and continues approximately .100" further before stopping.

F) The Element rotates slowly counterclockwise until the Element Home Positioner drops into the Element Home Notch on the Rear Scissors Gear under Spring Tension, which opens the Left End Switch, and the Element stops rotating.

G) The Carrier moves right approximately .250" to establish position "0," and then continues to the preset left margin (Space 12). The default settings are 10 pitch, with Left Margin at 12, one Tab set at 17, and Right Margin at 72.

H) The LCD is turned "ON." First the Smith Corona Copyright Message is displayed, followed by the Typewriter Status or Word Processor Main Menu.

The Left End Switch is also used as a Lid Switch. Whenever the Deck is raised, the Lid Switch Actuator closes the Left End Switch through Spring tension, and the Carrier moves to the approximate center of the Platen. When the Deck is closed, the Switch opens, and the Carrier reinitializes and relocates to its previous position.

3) KEYBOARD

The Keyboard is composed of Keybuttons mounted in a plastic housing along with individual leaf-type springs, molded Dome Conductive Switches, a Flexible Circuit PC Board, and a metal plate. When a Keybutton is depressed, the Keybutton contacts the leaf-type spring, which in turn pushes down on a Molded Dome Conductive Switch. The Conductive Switch then comes into contact with the 7 x 8 matrix Flexible Circuit PC Board which now completes a circuit between a specific Column and Row. This completed circuit is then read by the Electronics of the Control PC Board, which determines what key was depressed.

The Keypad is composed of Keybuttons pressed onto rubber contact Keyswitch Plungers which are mounted in a housing above the Flexible PC Board. The Keypad Flexible PC Board is a 1 column x 5 row matrix. The matrix consist of an open electrical circuit which is closed by a conductive rubber Keyswitch Plunger. Refer to the appropriate Diagrams in the Diagrams Section for Layout and Matrix Charts.

THEORY OF OPERATION

1) POWER SUPPLY

When the Personal Word Processor's AC plug is inserted into an AC outlet and the Power Switch is turned on, line voltage is applied to the primary winding of the transformer. Voltage is induced by two separate secondary windings of the transformer to produce two separate secondary voltages, 24 VAC and 18 VAC.

The 24 VAC is applied to the Bridge Rectifier CR10 on the Control PC Board, which provides approximately 24 VDC input to the following:

A) 18 Volt Regulator Circuit
B) 6.5 Volt Regulator Circuit

The major components of the 18 Volt Regulator Circuit are Q13, L1, and U14. Together these components produce a regulated +18 VDC ± 6.5%.

Components Q9, U15, L2, C29, and CR24 make up the 6.5 Volt Regulator Circuit, which provides a regulated +6.5 VDC ± 6.5% to various components and to Regulator U16.

Regulator U16 provides a regulated +5 VDC ± 5%.

The 18 VAC from the other transformer secondary winding is half wave rectified by components CR25 and C23. This half wave voltage is regulated by Zener Diode CR26 at -13 VDC ± 4%.

If the +5 VDC drops to zero volts, R36, R37, & R42 allow transistor Q5 to conduct which in turn shorts the -13 VDC to ground. This is a safety circuit to turn off the -13 VDC to the Liquid Crystal Display (LCD) if the +5 volt regulator fails.

The +5 VDC is used for Integrated Circuits, Shift Lock LED, Liquid Crystal Display (LCD), Carrier Holding Voltage, and Disk Drive.

The +6.5 VDC is used for driving the Disk Drive Motor.

The +18 VDC is used for driving the Carrier, Element, and Index Motors, the Hammer Solenoid, the Ribbon Solenoid, the DC/AC Inverter, and some discrete PC Board Components.

The -13 VDC is used for the Contrast Control potentiometer and the LCD.

The Control PC Board has a Watchdog Control circuit that monitors correct voltage to the following components:

A) Hammer Solenoid
B) Ribbon Solenoid
C) Carrier Phase CB
D) Carrier Hold CPS

If any of these components are left on, the Watchdog circuit places a high at Pin 9 (Reset) of the 8053 microprocessor. This forces the 8053 to reset and start the initialization process all over again. If the condition is not cleared, the Watchdog Circuit repeats its action, and reinitialization occurs again.

For safety, the AC Power Supply has a replaceable .75 Ampere Slo-Blo Fuse mounted in the Power Cord Receptacle. Also, there is a .25 Ampere Pico Fuse mounted on the Control PC Board to protect the 18 Volt Power Supply circuit. If the Inverter for the EL Panel draws excessive current, the Pico Fuse blows.

SECTION 2

THEORY OF OPERATION

INDEX

	SUBJECT	PAGE NUMBER
1.	POWER SUPPLY	2-2
2.	INITIALIZATION	2-3
3.	KEYBOARD	2-3
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8.	CARRIER DRIVE	2-8
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10.	PRINT HAMMER	2-9
11.	CASSETTE RIBBON FEED/CORRECTION RIBBON LIFT & FEED	2-10
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13.	CORRECTION LIFT & FEED MECHANISM	2-11
14.	PAPER FEED	2-11

LIQUID CRYSTAL DISPLAY (LCD)

COLOR:	Transmissive Mode Super Twist LCD w/Blue/Violet Dots	
ACTUAL DISPLAY AREA:	Width:	80 Columns 480 Dots 9.258" (235.1mm)
	Height:	7 Lines 64 Dots 1.233" (31.3mm)

POWER REQUIREMENTS:

Logic Power Supply:	+5 VDC
Liquid Crystal Driver Supply:	-13 VDC
Liquid Crystal Driver Operating Voltage:	-13 VDC to 0 VDC
EL Panel (White):	120 VAC @ 600 Hz (inverted from +18 VDC)

DIMENSIONS (APPROXIMATE):	Width:	10.986" (279.1mm)
	Height:	3.0" (76.2mm)
	Depth:	.437" (11.1 mm)

DISK DRIVE

TYPE:	Single track spiral drive capable of storing and retrieving data from a double sided, single track storage disk
DISK ROTATING SPEED:	423 RPM $\pm$ 2.5%
DATA TRANSFER RATE:	101.5625 KBPS
MAGNETIC STORAGE AND RETRIEVAL:	Double sided, digital recording, storage, and retrieval medium, with 50 K storage in a maximum of ten files per side when prepared
MAGNETIC STORAGE MEDIUM:	3" Smith Corona DataDisk, double sided, double density

POWER REQUIREMENTS:	Logic Voltage:	+5 VDC
	Motor Voltage:	+6.5 VDC

DIMENSIONS (APPROXIMATE):	Length:	5.213" (132.41mm)
	Width:	3.905" (99.19mm)
	Height:	1.144" (29.06mm)

ELECTRONICS

CONTROL PC BOARD:

Master Microprocessor:	Z80B--Master Controller for all machine functions
Slave Microprocessor:	Programmed 8053: --Scans Keyboard, Left End, and Mode Switches --Controls Stepper Motors & Solenoids
ASIC:	Applications Specific Integrated Circuit: --Disk Controller --RAM Controller --ROM Controller --Model Selector --Clock Generator
Dictionary ROM:	1 or 2 Megabytes (depending on language)
Other ROM:	One 512 K EPROM--Initialization Routines and lower 2/3 of Operating Software. One 256 K EPROM--All Disk, Typing, and Printing Routines, and upper 1/3 of Operating Software.
RAM:	Two 64 K x Four bit DRAMs: --55 Character Keyboard Buffer --One Line Correction Buffer (in Typewriter Mode Only) --42,000 Character Word Processor Memory (PWP 40) --32,000 Character Word Processing Memory (PWP 3)
Other:	LCD Controller Module
Power Supply:	Produces Four DC Outputs: +5 VDC -13 VDC +6.5 VDC +18 VDC

SYSTEM PHYSICAL DIMENSIONS

HEIGHT:	5.72" (145.3mm)	WIDTH:	16.85" (427.9mm)
DEPTH:	16.13" (409.7mm)	NET WT:	16.5 lbs (7.5 Kg) with Casing Lid and Power Cord

SYSTEM ENVIRONMENTAL CONDITIONS

OPERATING TEMPERATURES:	55° F to 100° F (13° C to 38° C)
OPERATING RELATIVE HUMIDITY:	30% to 80%
STORAGE TEMPERATURE:	14° F to 122° F (-10° C to 50° C)
STORAGE RELATIVE HUMIDITY:	20% to 90%

PRINTING/PAPER HANDLING (continued)

RIBBON CASSETTES:

	CORRECTABLE CARBON	MULTI-STRIKE
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	55,000 Characters	205,000 Characters

CORRECTION TAPES:

	LIFT OFF (FOR CORRECTABLE)	COVER UP (FOR MULTI-STRIKE)
Width:	.31" (7.9mm)	.31" (7.9mm)
Yield:	1400 Characters	1400 Characters

STEPPER MOTORS: 4 Phase, Bi-directional, Permanent Magnet Stepper Motors

	CARRIER	ELEMENT	INDEX
Step Angle:	7.5°	7.5°	7.5°
Steps Per Revolution:	48	48	48
Resistance Per Phase:	50 OHMS	24 OHMS	50 OHMS
Run Voltage:	+18 VDC	+18 VDC	+18 VDC
Hold Voltage:	+5 VDC	NONE	NONE

PAPER FEED: Friction, Single Sheets or Forms

LINESPACING: 1 (6 Lines per Inch)
1-1/2 (4 Lines per Inch)
2 (3 Lines per Inch)
1/2 through Code Key for Super and Subscript
Variable through Platen Knob

MAXIMUM PAPER WIDTH: 12" (304.8mm)

PAPER CAPACITY: 1 original plus 2 copies

KEYBOARDS

KEYBOARD: 44 Printable Character Keys
12 Function Keys
56 Molded Dome Conductive Switches with Leaf Return Springs
7 x 8 Electronic Keyboard Matrix

CURSOR KEYPAD: 5 Function Keys
5 Rubber Contact Keyswitches
1 x 5 Electronic Keyboard Matrix

SECTION 1

SPECIFICATIONS

PWP40 (5DEA)
PWP 3 (5DCA)

POWER SUPPLY

POWER REQUIREMENTS:	117 VAC/60 Hz ± 10% 240 VAC/50 Hz ± 10%
FUSE PROTECTION:	.75 Amp, Slo-Blo
TRANSFORMER OUTPUT:	25.5 VAC to 42.4 VAC (No load) 17 VAC to 23 VAC
POWER SUPPLY PC BOARD OUTPUT:	+18 VDC, +6.5 VDC, +5 VDC, & -13 VDC
APPROXIMATE POWER CONSUMPTION:	20 WATTS (Idle) 70 WATTS (Printing)

PRINTING/PAPER HANDLING

PRINTING TECHNIQUE:	Fully formed character Daisy Print Element
CHARACTER SET:	96 printable characters on Print Element
CHARACTER SPACING (PITCH):	10 CPI: .100" (2.5mm) per space 12 CPI: .083" (2.2mm) per space
TYPING LINE LENGTH:	8.9" (226.1mm) 10 Pitch: 89 Characters per line 12 Pitch: 107 Characters per line
PRINT SPEED:	10 Characters per Second (maximum)
PRINT DIRECTION:	Typewriter Mode: Uni-directional (left to right) Word Processor Mode: Bi-directional
MARGINS:	Left Margin preset at space 12 (10 pitch) Right Margin preset at space 72 (10 pitch)
TABS:	One Preset at Space 17 (10 pitch); up to 8 programmable tab settings

STATIC ELECTRICITY

Static electricity in the service work area damages PC Boards. Smith Corona Typewriters and Word Processors are equipped with state of the art MOS IC's that are susceptible to damage by static electricity.

Damage can occur when handling or touching a PC Board or even when touching a connecting pin or wire that leads to the Board.

Static electricity is sometimes tough to identify. It takes about 10,000 volts of static electricity to feel a "zap" or see a spark. As little as 1000 volts can damage an IC. A person wearing synthetic soled shoes walking across a carpet in low humidity conditions can generate a charge of over 35,000 volts, enough to destroy all the MOS IC's on a PC Board.

The Liquid Crystal Display on a 5D Series Personal Word Processor also contains MOS IC's that are susceptible to static damage.

RECOMMENDATIONS

- Connect metal workbenches to ground with a one Meg Ohm resistor cord. Use conductive anti-static work mats, or particle board or wood as a work surface.
- Wear a wrist strap that is connected to ground through a one Meg Ohm Resistor when handling a PC Board AND when working on a machine with the top cover off.
- Do not have carpeting in the service area or on the workbench. Use an anti-static floor sealant on floor surfaces, particularly on vinyl surfaces.
- Do not allow synthetic fiber clothing (polyester, nylon, etc.) to contact machine components or the PC Board.
- Do not slide a PC Board over any surface.
- Keep the following static generators away from the work area:

  Styrofoam (including coffee cups) -- Candy wrappers -- Cellophane

NOTE: The pink bag in which Boards from Service Stores' are shipped does not induce a static charge, but it also does not prevent a static charge from going through to the PC Board. Take static precautions when handling a bagged Board.

The following anti-static equipment is available from National Service Stores:

PART #	DESCRIPTION
250166	VELCRO ADJUSTABLE WRIST STRAP
250167	10 FOOT ONE MEG OHM COILED CORD
250168	ALLIGATOR CLIP -- (Used for connecting coiled cord (250167) directly to an available ground)
250096	CIRCUIT TESTER WITH GROUND JACK -- (Used for connecting coiled cord (250167) to a power outlet's ground. Particularly useful when no other ground point is available. Circuit Tester also checks for correct wiring and polarity).

5D SERIES PERSONAL WORD PROCESSORS SERVICE MANUAL

CONTENTS

SECTION	SUBJECT
1	SPECIFICATIONS
2	THEORY OF OPERATION
3	LUBRICATION & CLEANING
4	REMOVALS
5	ADJUSTMENTS
6	TROUBLESHOOTING
7	5DEA/5DEC DIAGRAMS

SERVICE TOOLS

In addition to common service tools (screwdriver, pliers, volt/ohm-meters, etc.) and static protection devices normally required for typewriter service, the following tools are needed for servicing 5D Series Personal Word Processors:

PART NUMBER	DESCRIPTION
250065	#0 PHILLIPS SCREWDRIVER
250072	MTA WIRE INSERTER (.100" CENTERS)
250073	FEELER GAGE SET .0015"-.025"
250101	MTA WIRE INSERTER (.156" CENTER)
250159	CARRIER CAPSTAN CABLE CLIP
250162	TORX T-10 SCREWDRIVER
250165	TORX T-8 SCREWDRIVER

PREFACE

This Manual provides service information for Smith Corona 5D Series Personal Word Processors.

The Manual is divided into sections that cover the different service areas required to service the machine. Thus, there is an Adjustment Section, Removals Section, etc. Refer to the Contents Page for a listing of subjects covered.

Except for the Specifications Section, there is an Index of all information provided in each Section at the beginning of the Section.

Throughout the Manual, directional terms such as front, rear, top, bottom, left, right, etc., always refer to the machine as used by a typist. Consequently, "right" always refers to the Platen Knob side of the typewriter, regardless of the machine position necessary for checking a requirement or making an adjustment.

Satisfactory performance requires that all parts be properly adjusted and lubricated, and their movements be free of binds. Worn or broken parts should be replaced.

IMPORTANT

Some service procedures require working with static sensitive devices, such as the Liquid Crystal Display and the Printed Circuit Boards. Whenever a procedure involves one of these devices, the procedure is marked:

OBSERVE STATIC PRECAUTIONS

Read the reverse side of the Contents Page (Page ii) carefully for a full understanding of procedures to follow when working with static sensitive devices.

SMITH CORONA

5D SERIES PERSONAL WORD PROCESSORS

SERVICE MANUAL

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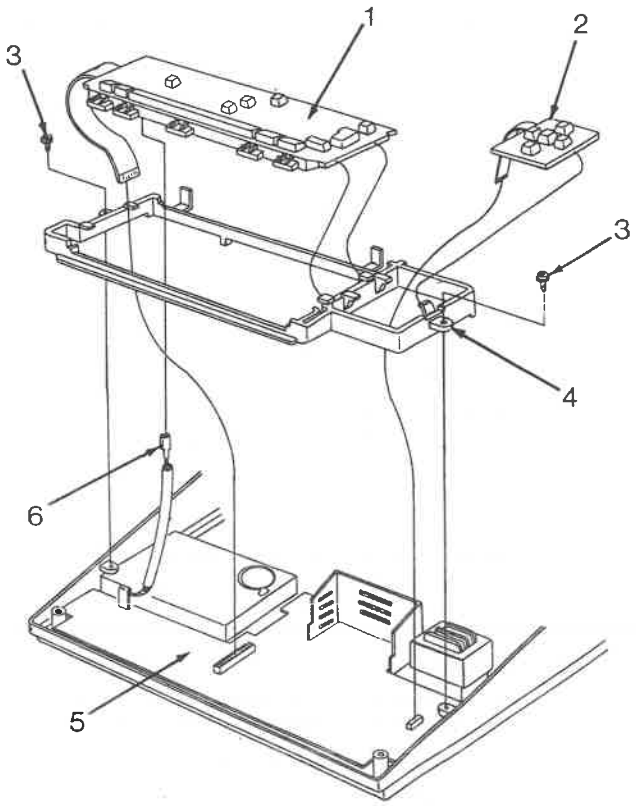
2. KEYBOARD AND CURSOR KEYPAD REMOVAL

1) Remove Mask/LCD Assembly (see Mask/LCD Assembly Removal).
2) Remove two SCREWS (3).
3) Disconnect Keyboard Flexible Cable and Cursor Flexible Cable Connectors from CONTROL PC BOARD (5). Disconnect GROUND CABLE (6) from KEYBOARD (1). Lift out KEYBOARD FRAME ASSEMBLY (4).
4) To remove CURSOR KEYPAD (2), disconnect Cursor Keypad Connector from Control PC Board, spread Keyboard Frame and lift out Keypad.
5) To remove KEYBOARD (1), disconnect Keyboard Connector, spread right side of Keyboard Frame, and lift out Keyboard.

REPLACEMENT: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.



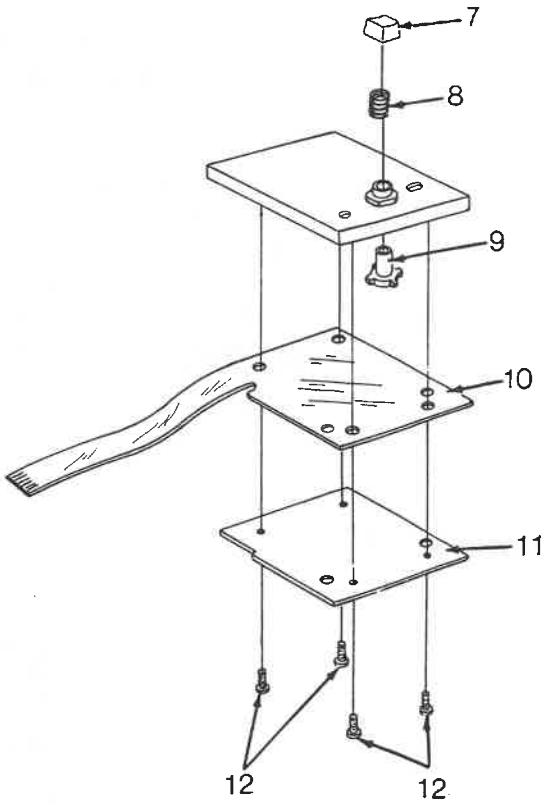
3. CURSOR KEYPAD KEYSWITCH PLUNGER REMOVAL

1) Remove Mask/LCD Assembly and Keypad.
2) With Keypad upside down, (Keybuttons facing down), remove SCREWS (12) and lift off Keypad METAL PLATE (11).
3) Lift off Keypad FLEXIBLE PC BOARD (10).
4) To remove KEYSWITCH PLUNGER (9), pry off KEYBUTTON (7) and lift SPRING (8) from the top of Keypad, and KEYSWITCH PLUNGER (9) from the bottom of Keypad.

NOTE: To remove a Cursor Keypad Keybutton, gently pry up on the Keybutton.

REPLACEMENT: Reverse procedure.

OBSERVE STATIC PRECAUTIONS



4. KEYBOARD COMPONENT REMOVALS

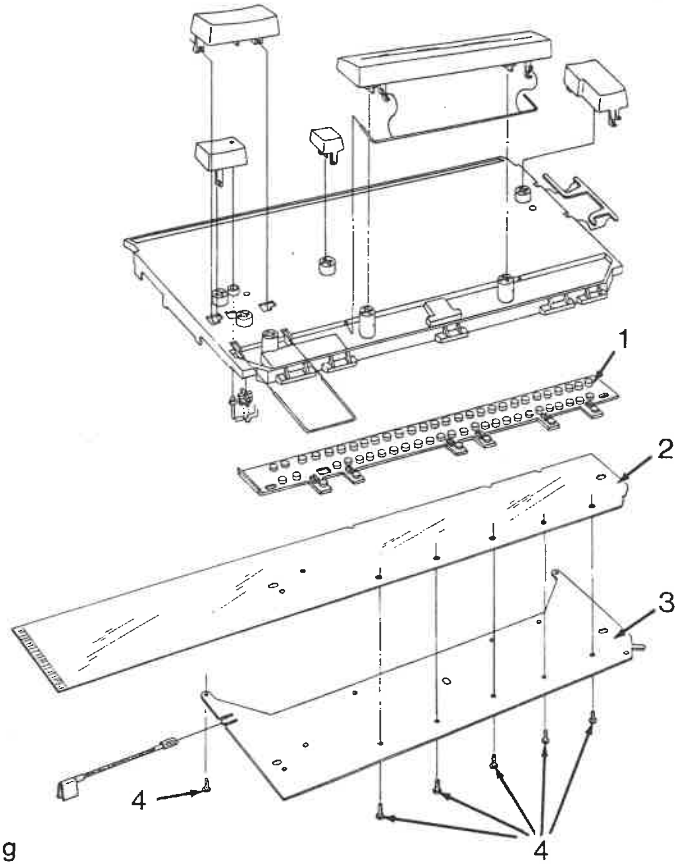
1) Remove Mask/LCD Assembly and Keyboard (see Removals Index).

2) With Keyboard upside down (Keybuttons facing down), remove SCREWS (4) and lift off Keyboard METAL PLATE (3).

3) Lift off Keyboard FLEXIBLE CIRCUIT (2), and MOLDED SWITCHES (1) from Keyboard.

4) Keybutton Removals:

The Keybuttons on the Keyboard cannot be removed by prying up the Keybutton Refer to the following procedure.



IMPORTANT

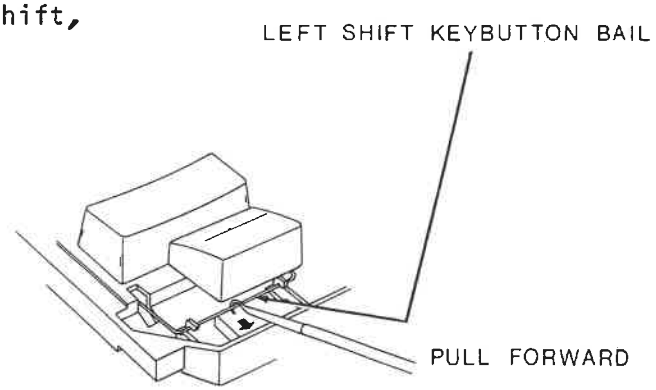
PRYING UP ON A KEYBUTTON DAMAGES THE STRIKER SPRING. IF A STRIKER SPRING GETS DAMAGED, THE ENTIRE KEYBOARD MUST BE REPLACED.

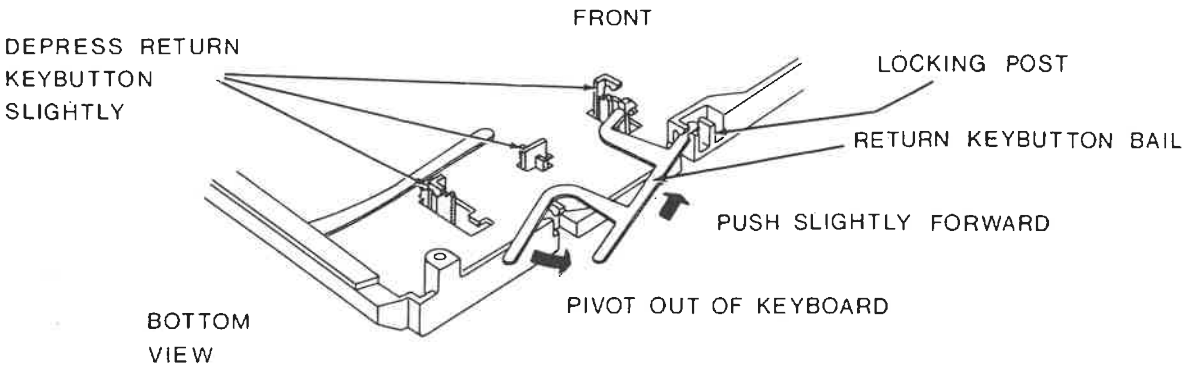
A. Remove the Keyboard from the Casing Base. Removal of the Keyboard Base Plate is not necessary, but the illustrations in this procedure show it removed.

B. When removing the Spacebar, Left Shift, or Return Keybutton, remove the Keybutton Bail first:

1) For the Spacebar or Shift Keybutton, use a Spring Hook on the Wire Bail, and pull forward to disengage the Bail from the Keyboard and Keybutton.

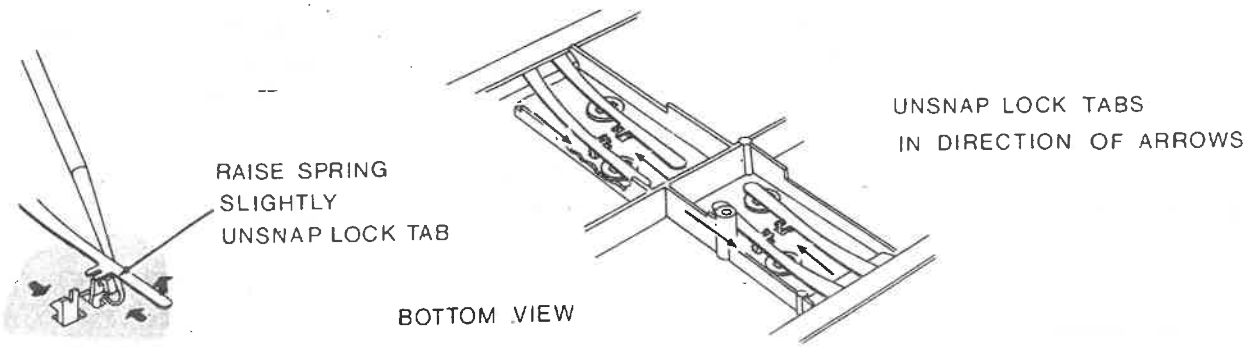
2) For the Return Keybutton, depress the Keybutton slightly, push gently forward on the Sheet Metal Bail, and pivot the Bail out of the Keyboard. BE CAREFUL NOT TO DAMAGE THE LOCKING POST WHEN PUSHING THE BAIL FORWARD.





4. KEYBOARD COMPONENT REMOVALS (continued)

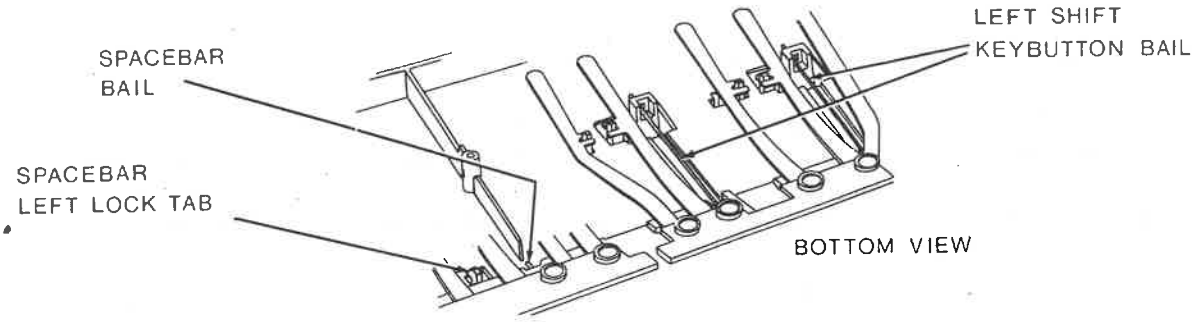
C. Turn the Keyboard upside down, and use a Spring Hook to raise the Striker Spring slightly to disengage it from the Keybutton. CAUTION: DO NOT RAISE THE STRIKER SPRING TOO FAR OR THE SPRING WILL GET DAMAGED. While holding the Spring away from the Keybutton, use the Spring Hook to unsnap the Keybutton Lock Tab from the Keyboard. The Keybutton drops out of the Keyboard Assembly. NOTE: The Spacebar has two Lock Tabs.



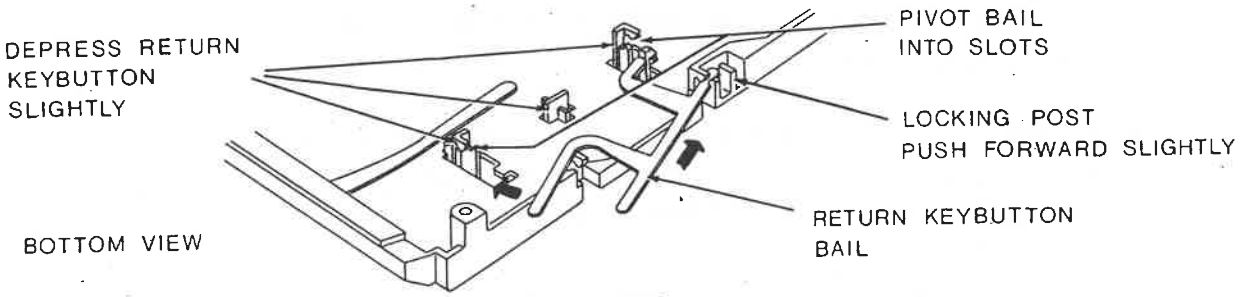
REPLACEMENT:

1. Align the Keybutton with the holes in the Keyboard, and snap the Keybutton in place.

2. a) When replacing the Spacebar or Left Shift Key Wire Bail, insert the Bail through the holes in the Keyboard. Make sure the ends of the Bail are properly aligned, and snap the front of the Bail into its locking tabs.



b) When replacing the Return Keybutton Sheet Metal Bail, depress the Keybutton slightly; gently push the end of the Bail slightly against the Keyboard post, and pivot the Bail into position. Make sure the Arms of the Bail seat in the Slots on the Keybutton.



c) Replace the Keyboard in the Casing Base.

5. LCD AND LCD HOUSING REMOVAL

1) Remove Mask/LCD Assembly from Casing Base (See Mask/LCD Removal)

2) Remove SCREW (5) and WASHER (6) from the underside of the Mask. Then remove the TOROID (7) and Ribbon Cable from STUD (8).

3) Unhook LCD RIBBON CABLE (10) and LCD GROUND CABLE (9) from the Cable RESTRAINT (11) on the Mask.

4) Wedge a Flat Tip Screwdriver between the Left MASK LCD SUPPORT (21) and the Left LOWER LCD HOUSING (22). Slightly twist the screwdriver and snap the LCD Housing from the Mask. Use the same procedure to snap the Right LCD Housing free from the Mask.

5) Remove two PLUGS (13) and two SCREWS (14).

6) Press down on the UPPER LCD HOUSING (12) and move it rearward to unsnap it from the LOWER LCD HOUSING (22).

7) Disconnect the LCD CONNECTOR (19) from the LCD and the INVERTER (4) from the EL Panel.

8) Remove six SCREWS (15) from the LCD, and remove the LCD Ground CABLE (9) and Ground SHIELD (16) from the LCD.

9) Lift the LCD (18) from the LOWER LCD HOUSING (22) and slide the EL PANEL (17) free of the LCD. NOTE: To remove the Plastic SLIDE (20) for the Contrast Control, lift up on top of Slide so it clears the stop and move the slide upward until it stops. SLIDE (20) will fall clear of Lower LCD Housing.

To remove the LCD CABLE ASSEMBLY (10) from the Mask:

10) Unwrap the three winds of the Ribbon Cable from the TOROID (7) and remove Toroid.

11) Feed the LCD Cable Assembly through the top side of the Mask.

REPLACEMENT: Reverse procedure. When reassembling the LCD in the Lower LCD Housing, be sure that the LCD contrast control actuator seats in the forks of the Plastic SLIDE (20) of the Lower LCD Housing. Also, make sure that all cabling is properly routed and that LCD Cable is wrapped properly around Toroid. Be sure EL Panel SLOT (1) seats on POST (2) and INVERTER (4) rest in Inverter WELL (3).

6. LCD HOUSING BRAKE ASSEMBLY REMOVAL

With upper LCD Housing flat on work surface, rotate Brake Assembly so it is 90 degrees to upper LCD Housing.

1) Spread BRAKE COLLAR (26) and remove from right side of UPPER LCD HOUSING (12).

2) Compress SPRING (25) and remove from LCD Housing.

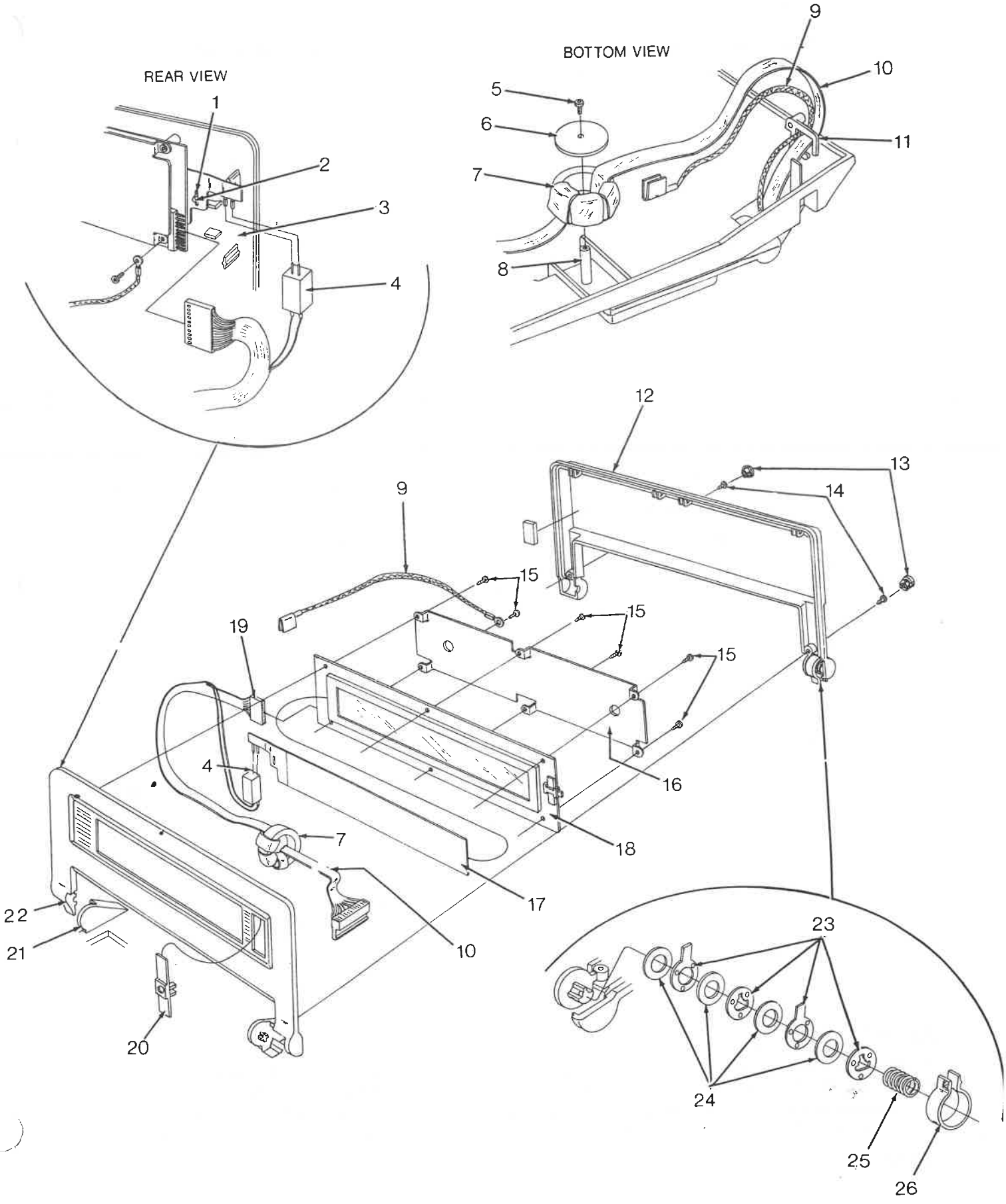
3) Remove DISKS (23) and CORK PADS (24) from right side of Upper LCD Housing.

REPLACEMENT: Proper reassembly is necessary for correct braking action.

A) Install the Disks and Cork Pads in the sequence illustrated. NOTE: Mold marks in the Plastic Disks should all face in the same direction.

B) Compress and install SPRING (25).

C) Install BRAKE COLLAR (26) with tapered corners facing out.


REAR VIEW
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BOTTOM VIEW
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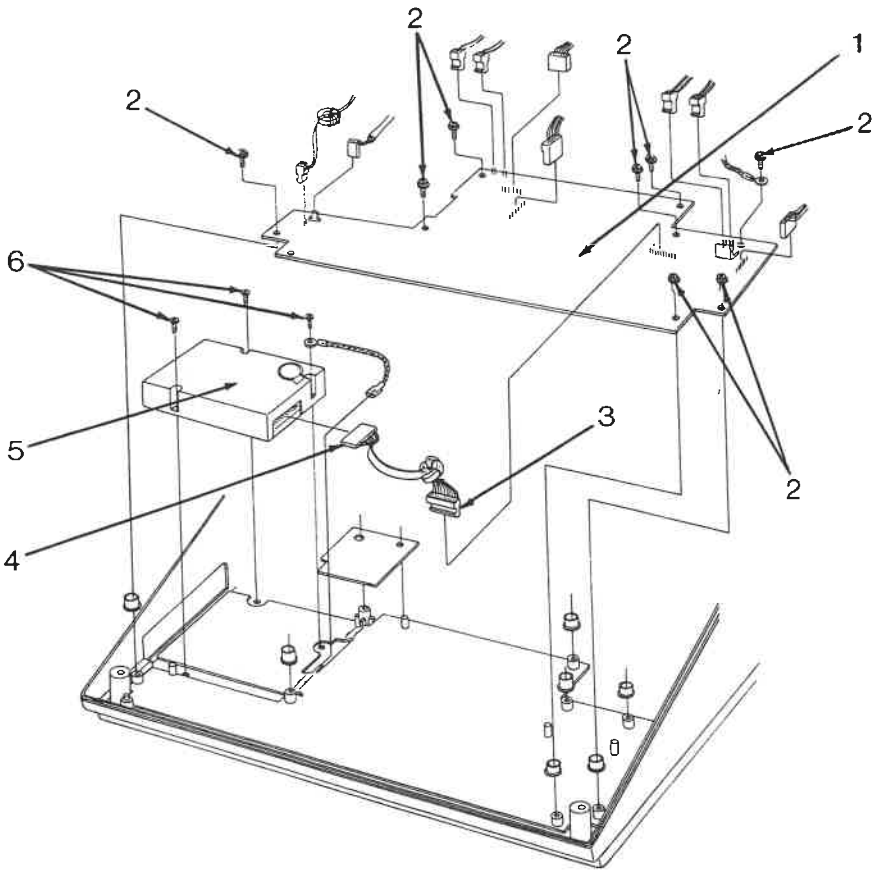
7. CONTROL PC BOARD REMOVAL

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Disconnect all Connectors from CONTROL PC BOARD (1).
3) Remove SCREWS (2); free Ground Cables, and lift out CONTROL PC BOARD (1).

REPLACEMENT: Reverse procedure. Refer to Wiring Diagrams for connections to PC Board.

OBSERVE STATIC PRECAUTIONS



8. DISK DRIVE REMOVAL

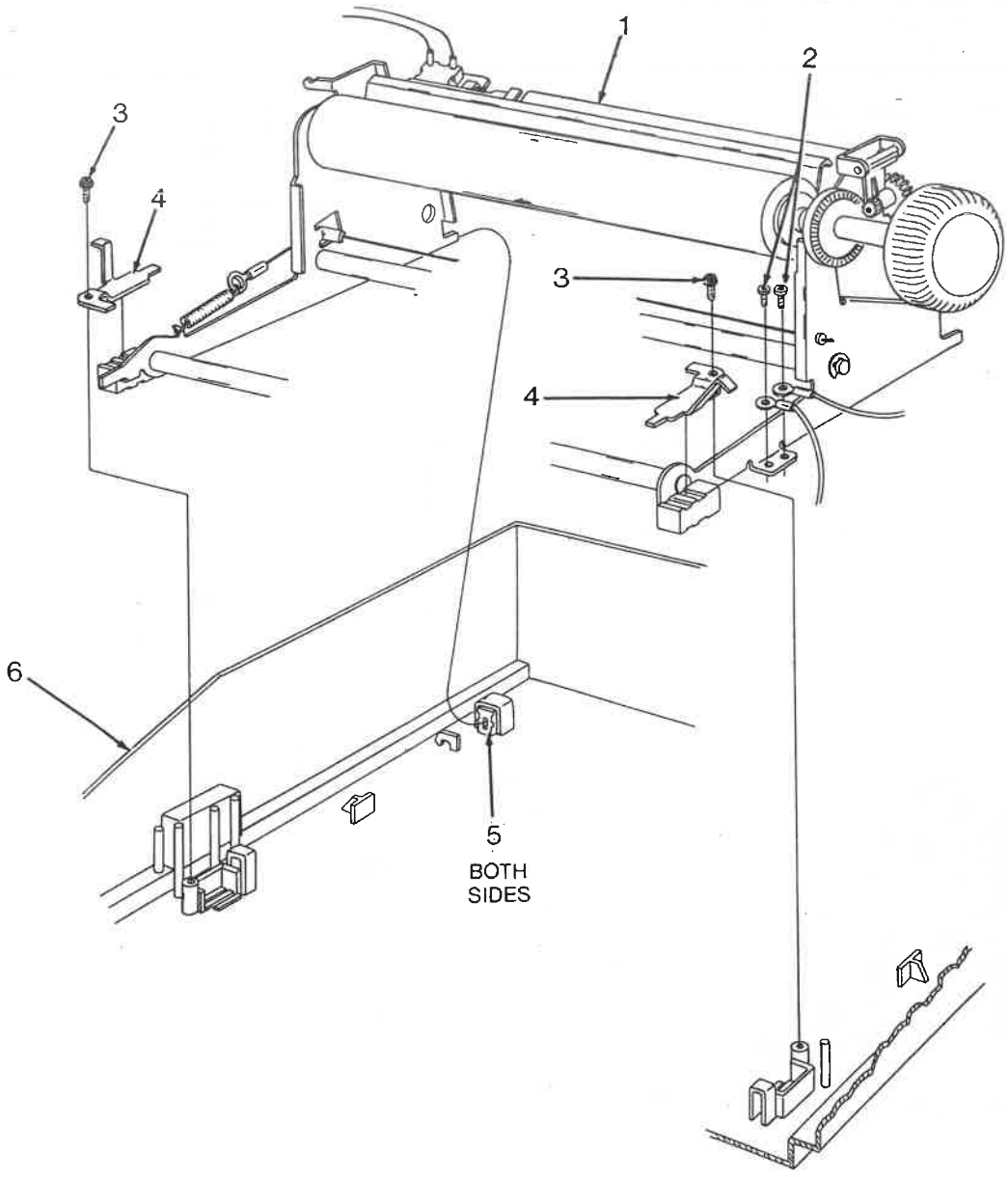
1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Disconnect DISK DRIVE CABLE CONNECTOR (3) from CONTROL PC BOARD (1).
3) Remove three SCREWS (6), free Disk Drive Ground Cable, and lift out DISK DRIVE (5). DISK DRIVE CABLE (4) can now be unplugged from Disk Drive.

REPLACEMENT: Reverse procedure.

9. FRAME ASSEMBLY REMOVAL (with Carrier & Paper Handling)

1) Remove Mask/LCD Assembly and Keyboard Frame Assembly (see Removals Index).
2) Remove two SCREWS (3) and two FOOT RETAINERS (4) from Casing Base.
3) Remove two FRAME GROUND SCREWS (2) and Ground Wires from Frame.
4) Disconnect Left End Switch Connector from Control PC Board and unhook wires from retainer in Casing Base.
5) Disconnect all Motor and Solenoid Connectors from Control PC Board.
6) Free Spiral Harness and component wires from Casing Base.
7) Lift FRAME ASSEMBLY (1) out of CASING BASE (6). NOTE: This requires some force since the fit is tight. The two rear FEET (5) of the Frames will remain in the Casing Base.

REPLACEMENT: Reverse procedure.



10. POWER SUPPLY REMOVAL

FUSE REMOVAL

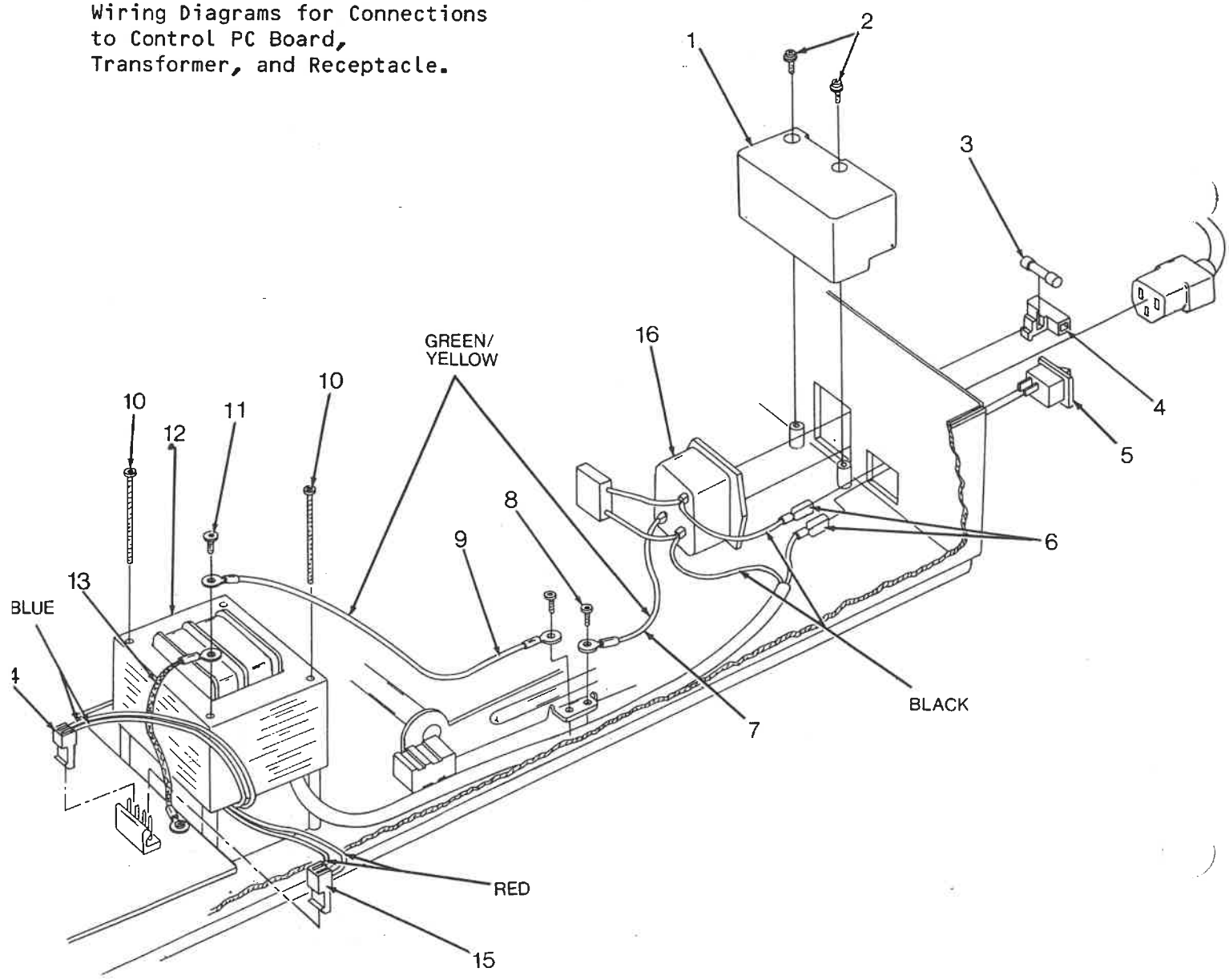
1) Snap out FUSE HOLDER (4) and remove FUSE (3).

TRANSFORMER & RECEPTACLE ASSEMBLY REMOVAL

1) Remove Mask/LCD Assembly (see Removals Index).
2) Remove two COVER SCREWS (2) and lift off POWER SUPPLY COVER (1).
3) Disconnect Switch CONNECTORS (6) from OFF-ON SWITCH (5).
4) Remove SCREW (8) and SCREW (11) to free GROUND WIRES (7), (9) & (13).
5) Disconnect CONNECTORS (14) & (15) from Control PC Board.
6) Remove two TRANSFORMER SCREWS (10).
7) Lift out TRANSFORMER (12) and RECEPTACLE (16).

REPLACEMENT: Reverse procedure.

NOTE: Power Supply parts are keyed to Guide Studs and Slots in the Casing Base. Refer to Wiring Diagrams for Connections to Control PC Board, Transformer, and Receptacle.



11. CORRECTION BAIL REMOVAL

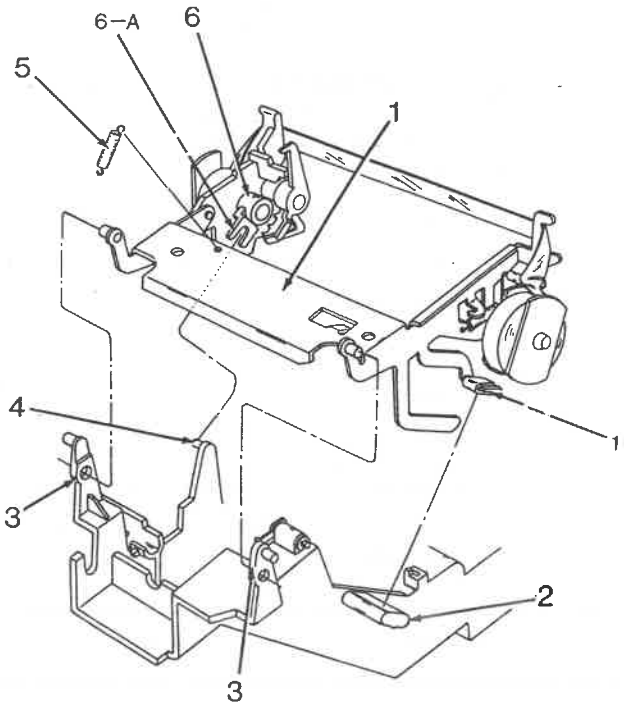
1) Remove Print Element and Ribbon Cassette. Correction Ribbon may be left in place.

2) Unhook SPRING (5) from Correction Bail.

3) Remove Correction Bail from Carrier by pushing out on Ribbon Cassette PIVOT MOUNTS (3). NOTE: CORRECTION FEED ARM (6) may drop off.

REPLACEMENT: Reverse procedure.

NOTE: Make sure FORK (6-A) of Correction Feed Arm engages STUD (4), and that DOWNSTOP TAIL (1-A) is on top of Bail DOWN STOP (2) on Carrier.



12. CORRECTION/CASSETTE RIBBON SOLENOID REMOVAL

1) Remove Frame Assembly and Correction Bail (see Removals Index).

2) Unhook SPRING (10) from RIBBON SOLENOID (11).

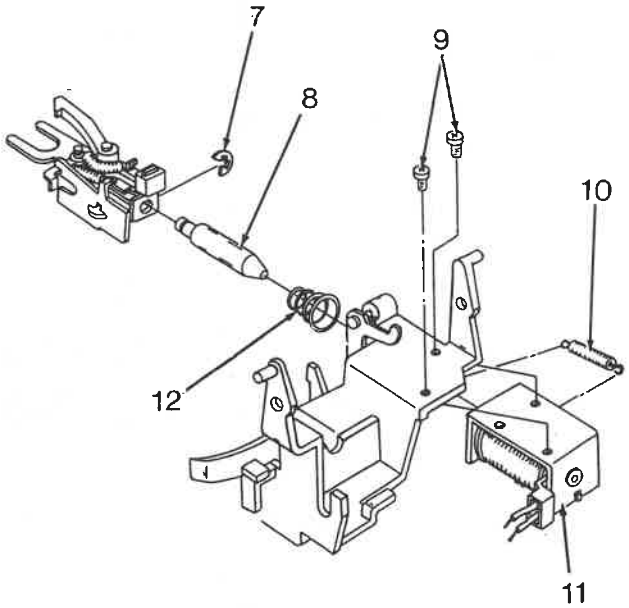
3) Remove two SCREWS (9) and lift out Solenoid.

4) Remove E-RING (7) from Solenoid Plunger. Lift out PLUNGER (8) and SPRING (12).

REPLACEMENT: Reverse procedure.

NOTE: Make sure SOLENOID SPRING (12) is installed as shown in illustration, and that SPRING (10) is in "V" Slot of Ribbon Solenoid.

ADJUSTMENTS BROKEN: Correction Ribbon Lift Adjustment (Adjustment #7).



13. RIBBON MECHANISM REMOVAL

NOTE: RIBBON DRIVER (1) may be removed from Ribbon Driver Assembly with no other removals by pulling it straight up out of Assembly with a pair of Needle Nose Pliers. SPRING (2) may fall free. Use Needle Nose Pliers to replace RIBBON DRIVER (1).

1) Remove Frame Assembly, Correction Bail, and Correction/Cassette Ribbon Solenoid (see Removals Index).

2) Remove SCREW (10), E-RING (8), STUD (6), and CORRECTION LIFT BELLCRANK (7).

3) Lift out Ribbon Shaft Assembly from CARRIER MOLDING (9).

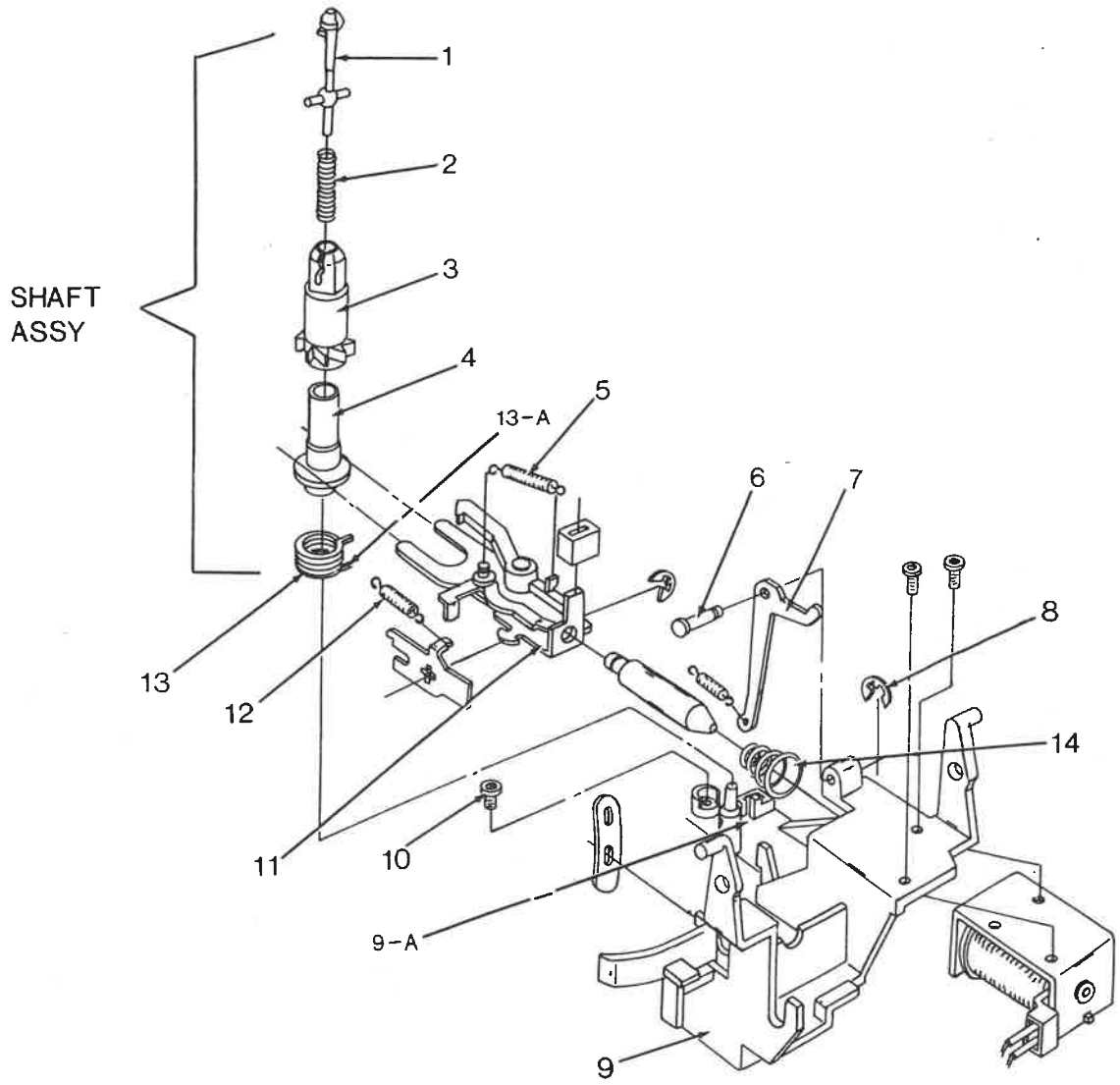
4) Remove RIBBON DRIVE RATCHET HUB (3) from RIBBON FEED SHAFT (4) by pulling apart.

5) Remove ANTI BACKUP FEED SPRING (13) from RIBBON FEED SHAFT (4).

6) Remove RIBBON FEED SPRING (5) and BLACK LATCH SPRING (12) from RIBBON FEED ASSEMBLY (11).

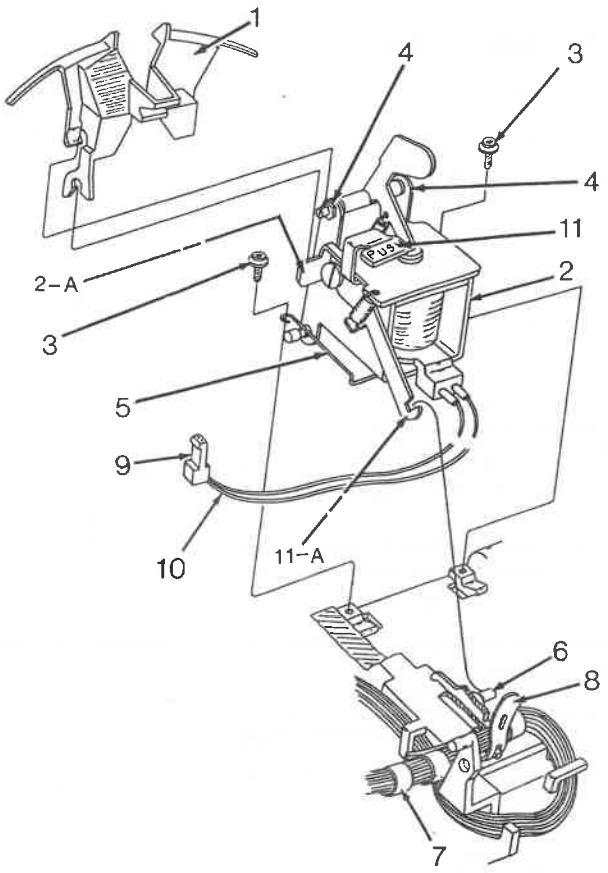
REPLACEMENT: Reverse procedure. NOTE: SPRING TAB (13-A) seats in molded NOTCH (9-A) in CARRIER MOLDING (9). Also, make sure SOLENOID SPRING (14) is installed as shown in illustration.

ADJUSTMENTS BROKEN: Correction Ribbon Lift Adjustment (Adjustment #7).



14. HAMMER SOLENOID ASSEMBLY REMOVAL

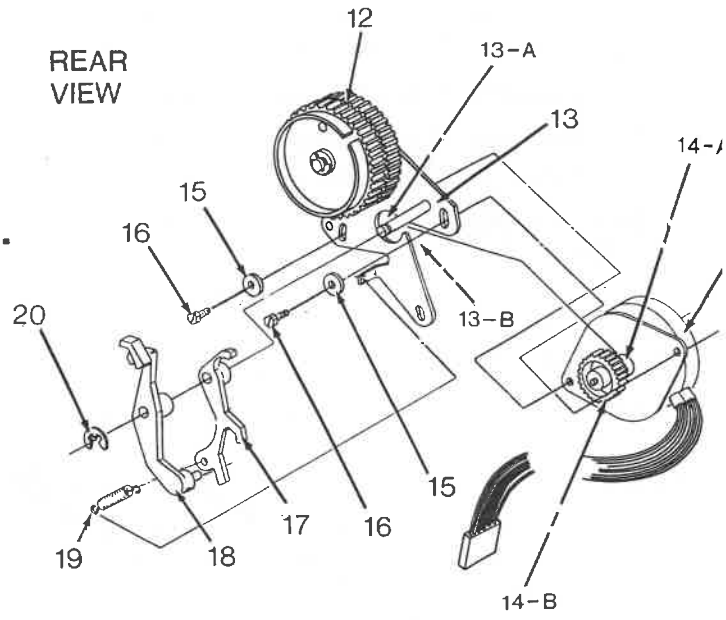
1) Remove Correction Bail (see Removals Index).
2) Remove RIBBON GUIDE (1) from Hammer PIVOT NUTS (4) and EAR (2-A).
3) Unhook WIRE STRAP (8) from Carrier.
4) Remove two SCREWS (3) and RETAINING WIRE (5).
5) Press PUSH LEVER (11) downward slightly, and lift HAMMER SOLENOID ASSEMBLY (2) out of Carrier.
6) Remove two HAMMER WIRES (10) from spiral WIRE BINDER RETAINER (7).
7) Disconnect Hammer Solenoid CONNECTOR (9) from Control PC Board.



REPLACEMENT: Reverse procedure.
NOTE: Formed area of Retaining Wire fits under Lip of Carrier Molding, and STUD (6) fits in SLOT (11-A).

15. ELEMENT MOTOR REMOVAL

1) Remove Frame Assembly (see Frame Assembly Removal).
2) Unhook SPRING (19). Remove 'E' RING (20), HOME POSITIONER (18) and ACTUATOR (17).
3) Remove two SCREWS (16) and two WASHERS (15).
4) Push ELEMENT MOTOR (14) forward to disengage BEARING (14-A) from HOLE (13-A) in MOTOR BRACKET (13), and slide Motor out through SLOT (13-B).



REPLACEMENT:

A) Wind ELEMENT SCISSOR GEARS (12) against spring tension and hold Gears.
B) Slide ELEMENT MOTOR (14) through BRACKET SLOT (13-B), and push MOTOR (14) rearward so BEARING (14-A) seats in BRACKET HOLE (13-A) while making sure DRIVE GEAR (14-B) meshes with SCISSOR GEARS (12). Release Scissor Gears after Bearing is seated and Gears are meshed.
C) Reassemble remaining components in reverse sequence.

ADJUSTMENTS BROKEN: Element Motor Position (Adjustment #2).

16. ELEMENT DRIVE SHAFT AND BEARINGS REMOVAL

1) Remove Element Motor and Hammer Solenoid Assembly (see Removals Index).

2) Remove E-RING (1), Outer SCISSOR GEAR (2), and SPRING (3).

3) Pry off Inner SCISSOR GEAR (4). NOTE: This Gear must be replaced with a new one after prying it off.

4) Remove two SCREWS (5).

5) Pivot STUD (6-A) out of SLOT (10-A) in CARRIER MOLDING (10), and remove BRACKET (6), BEARING RETAINER (7), BEARINGS (8), SPRING (9), WASHER (11), and ELEMENT DRIVE SHAFT ASSEMBLY (12). CAUTION: Carefully remove BRACKET (6) to overcome SPRING (9) tension.

REPLACEMENT:

A) Insert ELEMENT DRIVE SHAFT (12) with WASHER (11) through Drive Shaft Hole in CARRIER MOLDING (10).

B) Reassemble BEARINGS (8), SPRING (9), BEARING RETAINERS (7), and BRACKET (6) on Drive Shaft. NOTE: Smaller diameter of BEARINGS (8) fit into RETAINERS (7). Shoulder End of RETAINERS (7) seats in SPRING (9).

C) Replace two SCREWS (5).

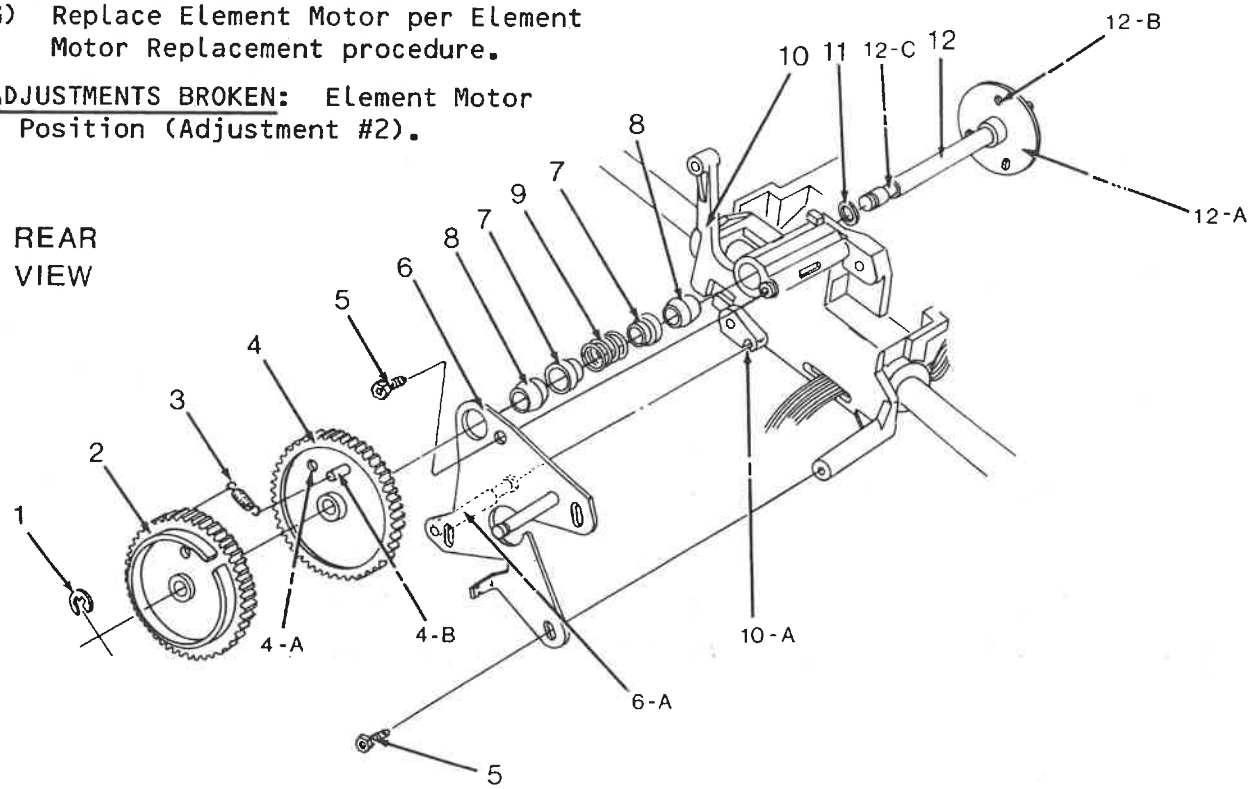
D) Rotate DRIVE DISC (12-A) so that Round HOLE (12-B) is at 12 o'clock position. Hold new Inner SCISSOR GEAR (4) with HOLE (4-A) at about 11 o'clock position as viewed from the rear (Arrow molded inside gear should be parallel with the Rear Frame Crosspiece), and press Gear onto Drive Shaft until it bottoms on Drive Shaft SHOULDER (12-C). NOTE: This positioning assures that Element Motor will be within adjustment range when reassembled.

E) Assemble SPRING (3) to Inner GEAR SPRING ANCHOR (4-B) with other Spring Loop facing HOLE (4-A). Place Outer GEAR (2) on SHAFT (12), hook Spring Loop with Outer Gear Spring Anchor, and twist Gears until Spring Anchors fit in Gear Holes: Assemble E-RING (1).

F) Replace Hammer Solenoid Assembly.

G) Replace Element Motor per Element Motor Replacement procedure.

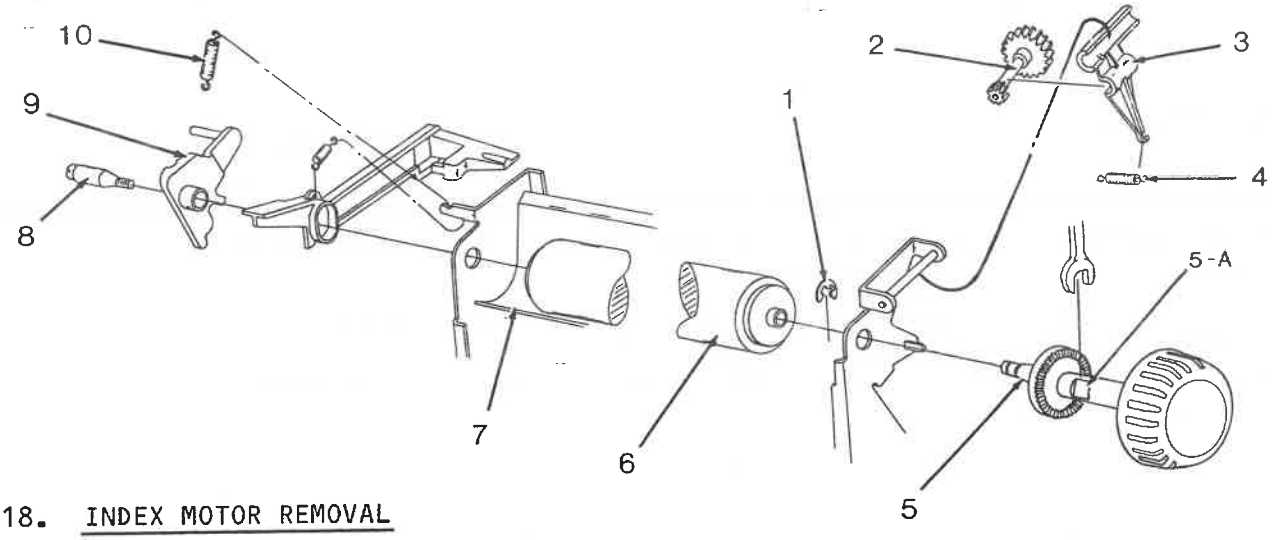
ADJUSTMENTS BROKEN: Element Motor Position (Adjustment #2).



17. PLATEN AND PAPER TABLE REMOVAL

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Unhook SPRING (4) from LINESPACE PINION PIVOT (3). Remove PIVOT (3) and LINESPACE PINION ASSEMBLY (2).
3) Unhook SPRING (10) and remove PAPER RELEASE LEVER (9).
4) Remove E-RING (1).
5) Hold PLATEN KNOB SHAFT (5) with a 3/8" wrench over square portion of KNOB SHAFT (5-A) and remove SCREW (8). NOTE: If you hold the Platen Knob, it will likely break when loosening SCREW (8).
6) Hold PLATEN (6) and unscrew PLATEN KNOB SHAFT (5).
7) Lift out PLATEN (6) and PAPER TABLE (7).

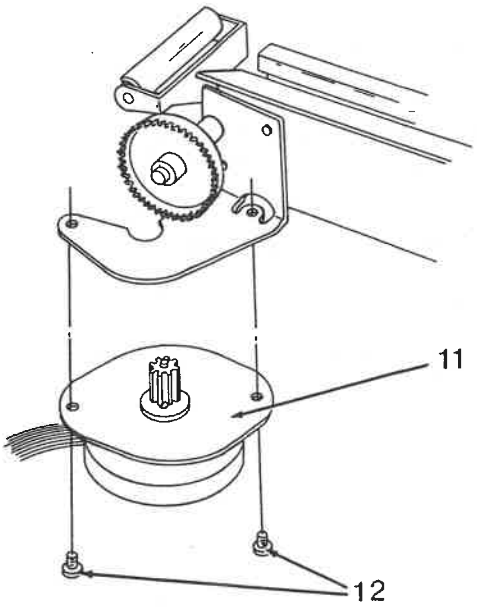
REPLACEMENT: Reverse procedure. NOTE: Stud in Paper Table seats in Hole in Paper Release Shaft.



18. INDEX MOTOR REMOVAL

1) Remove Mask/LCD Assembly and Frame Assembly (see Removals Index).
2) Remove SCREWS (12) and lift out INDEX MOTOR (11).

REPLACEMENT: Reverse procedure. NOTE: Make sure Motor Gear meshes with Intermediate Gear.



19. CARRIER MOTOR AND CARRIER CAPSTAN/DRIVE CABLE ASSEMBLY REMOVAL

1) Remove Frame Assembly and Carrier Molding (see Removals Index).

2) Remove Right Line Indicator SCREW (4).

3) Remove two SCREWS (8).

4) Unhook SPRING (1).

5) Remove CABLE ANCHOR (15-C) from Right Frame, and lift out CAPSTAN BRACKET (10) and CARRIER MOTOR (9). Remove Carrier Motor from Bracket.

6) Remove NUT (6), SCREW (7), and Capstan/Scissor Gear Assembly from BRACKET (10).

7) Remove C-CLIP (12), SCISSOR GEAR (13), and SPRING (14) from CAPSTAN/DRIVE CABLE ASSEMBLY (15).

REPLACEMENT:

A) Pull Cable through Capstan until mark on Cable appears in Front Capstan SLOT (15-D). If there is no mark on the Cable, mark the Cable approximately 14.1" (14 1/8") from the inside of the ring terminal to the window of the capstan pulley. Wind Spring End of Cable 3 3/4 TO 4 winds clockwise in Grooves of CAPSTAN (15).

Hold wound Cable in place and wind other end of Cable three turns counterclockwise in Grooves of Capstan. Make sure Cable windings do not cross. Install CARRIER CAPSTAN CLIP (P/N 250159) to hold Carrier Windings in place.

B) Reassemble CAPSTAN (15), SPRING (14), SCISSOR GEAR (13), C-CLIP (12), SCREW (7), and NUT (6) to BRACKET (10).

C) Wind SCISSOR GEAR (13) against spring tension, hold Gear, and insert CARRIER MOTOR (9) through Hole in BRACKET (10). Hold Carrier Motor Gear in mesh with Scissor Gears.

D) Thread SPRING ANCHOR (15-A) through CARRIER MOLDING (5) and assemble BRACKET (10) and SCREWS (8) to CARRIER MOLDING (5).

NOTE: BRACKET (10) is keyed to fit on Carrier Molding.

E) Assemble CABLE ANCHOR (15-C) to Right Frame.

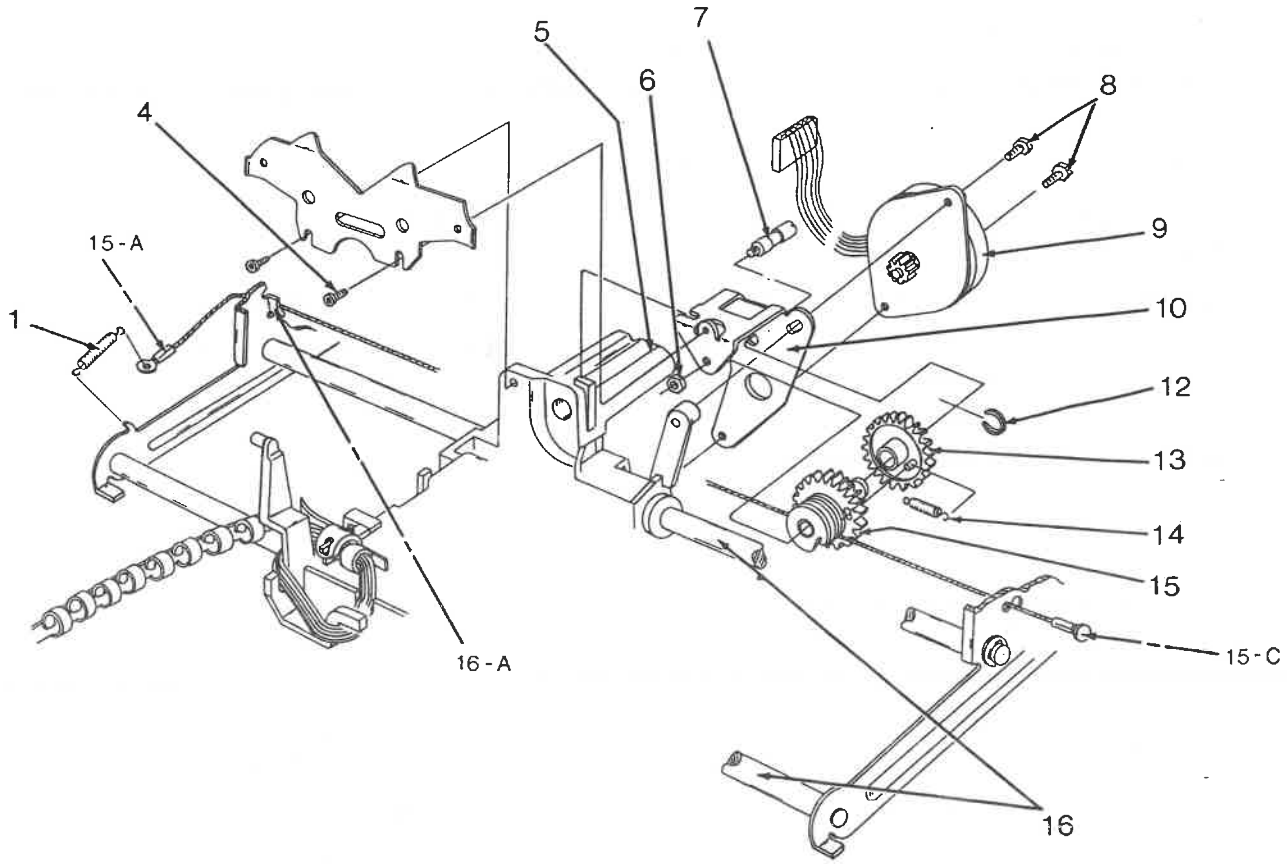
F) Hook SPRING (1) to SPRING ANCHOR (15-A) and route CABLE (15-B) around GUIDE (16-A): Hook SPRING (1) to Left Frame.

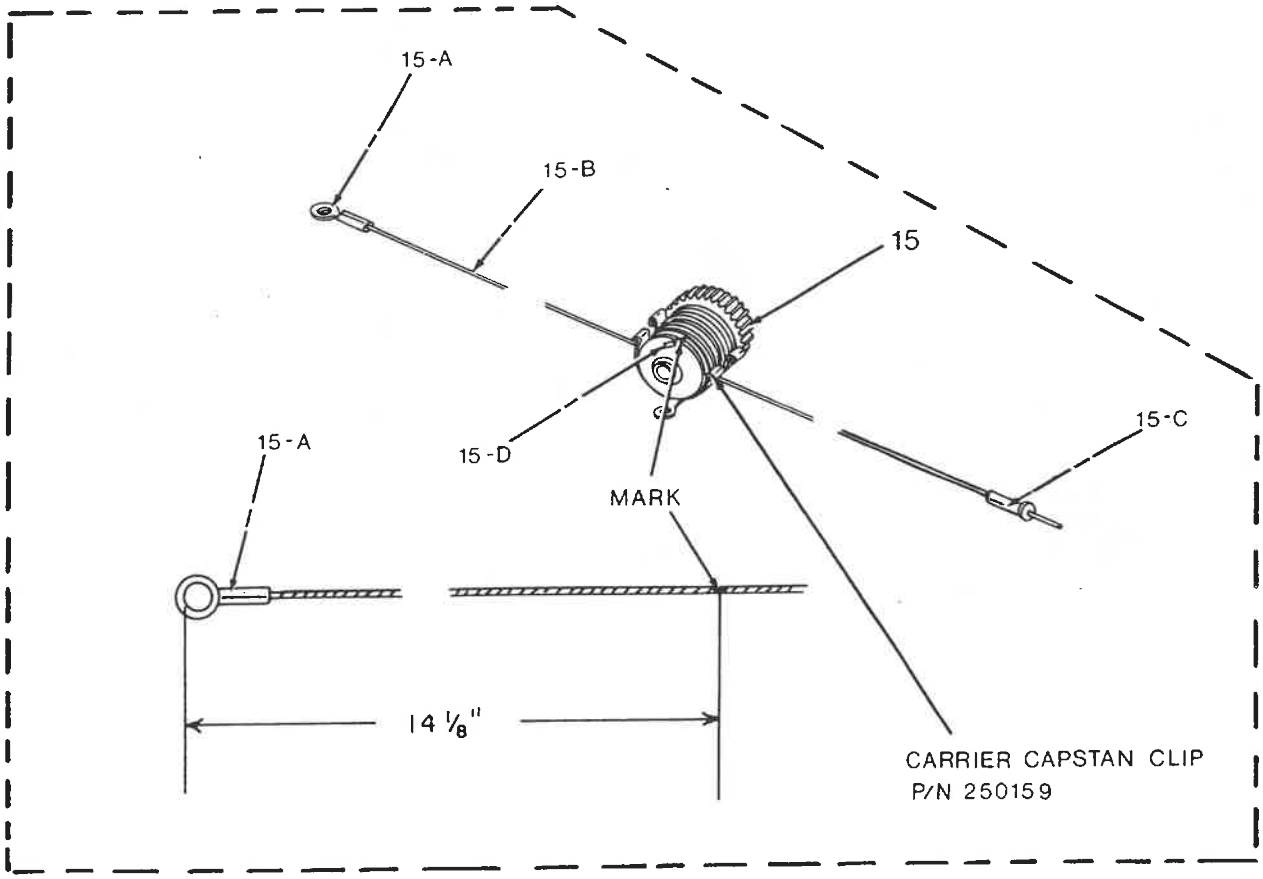
G) Move Carrier to the left to remove Carrier Capstan Clip. Run Carrier back and forth the full length of the Rails several times to exercise Cable.

H) Reassemble remaining parts in reverse sequence.

NOTE: Lubricate Cable Groove in Side Frame and Stud (see page 3-3).

ADJUSTMENTS BROKEN: Line Indicator Position (Adjustment #8).


1
4
5
6
7
8
9
10
12
13
14
15
15-A
15-C
16
16-A


15-A
15-B
15
15-D
15-C
15-A
MARK
14 1/8"
CARRIER CAPSTAN CLIP
P/N 250159

20. CARRIER MOLDING REMOVAL

1) Remove Frame Assembly, Capstan Cable, Platen, and Paper Table (see Removals Index).

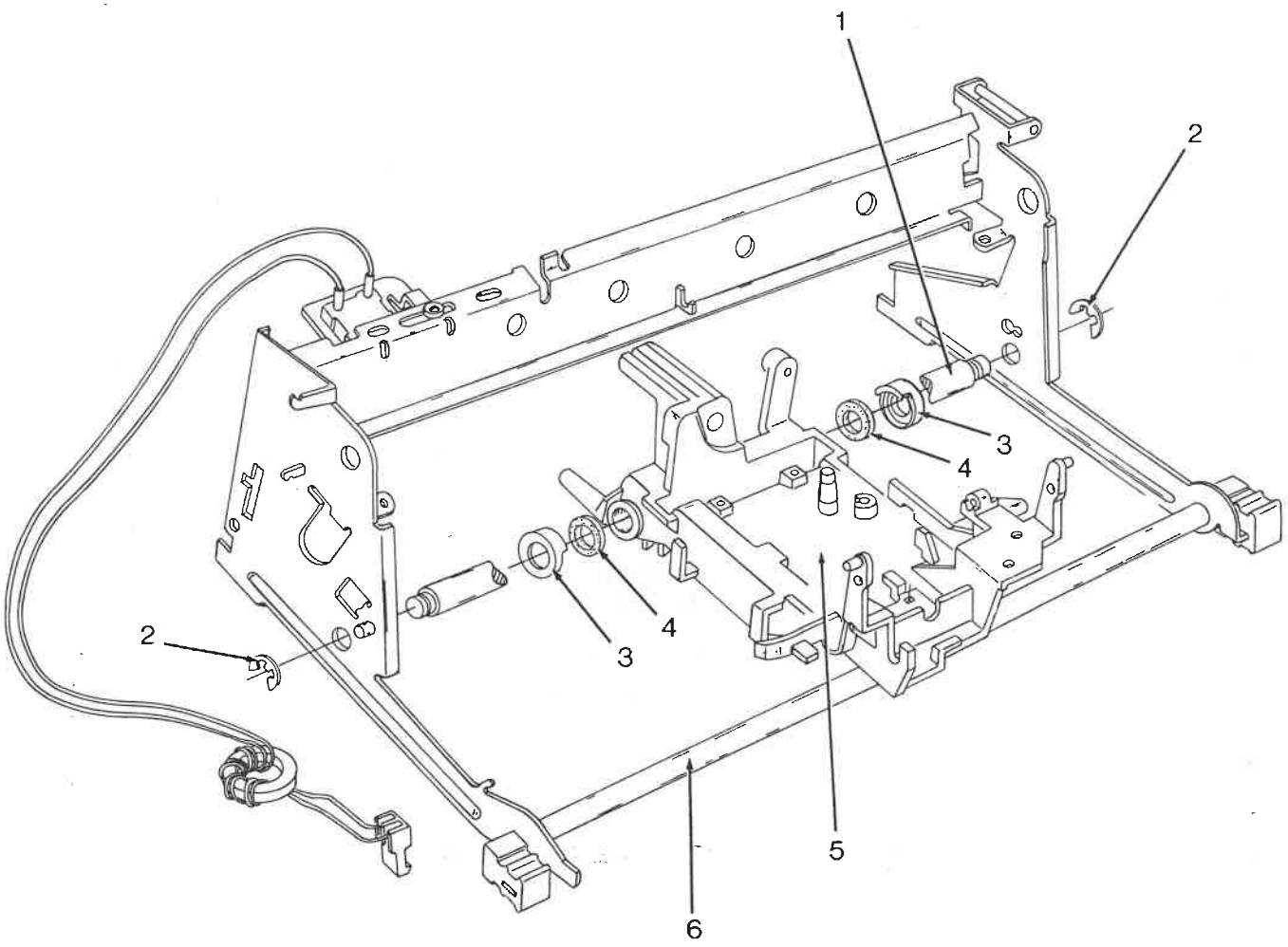
2) Remove two E-RINGS (2), from REAR RAIL (1).

3) Disengage CARRIER MOLDING (5) from FRONT RAIL (6), and slide REAR RAIL (1) out of Carrier Molding.

4) Snap off two FELT RETAINERS (3), and remove two FELTS (4).

REPLACEMENT: Reverse procedure. NOTE: To replace Carrier Molding, remove all components from Molding (see Removals Index). For replacement, reverse procedures.

ADJUSTMENTS BROKEN: 2, 4, & 8.



SECTION 5

ADJUSTMENTS

ADJUSTMENT INDEX

Sequential Adjustment Branch Display	Adjustment	Page
1	1. Left End Switch Adjustment	5-3
2	2. Element Motor Position	5-3
↓ 3	3. Hammer Center Position	5-4
4	4. Hammer Assembly Position	5-5
↓ 5	5. Ribbon Guide Position	5-5
6	6. Cassette Ribbon Position	5-6
7	7. Correction Ribbon Lift	5-6
8	8. Line Indicator Position	5-7
9	9. Line Indicator Clearance from Platen	5-7

An Arrow (——→) means "affects."

GENERAL ADJUSTMENT PROCEDURE: Casing Top removal is required for access to most checks and adjustments. Additional access requirements are noted when applicable.

All adjustments should be checked with Power Cord unplugged unless otherwise specified.

Circled reference numbers (i.e. (5)) in the illustrations indicate adjustment points.

SEQUENCE OF ADJUSTMENTS: Adjustments in this section are consecutively numbered and should be performed in sequence. Page 5-1 includes a Branch Display that shows sequence relationships among adjustments. The arrow (⟶) means "affects." For example:

2
↓
3

4

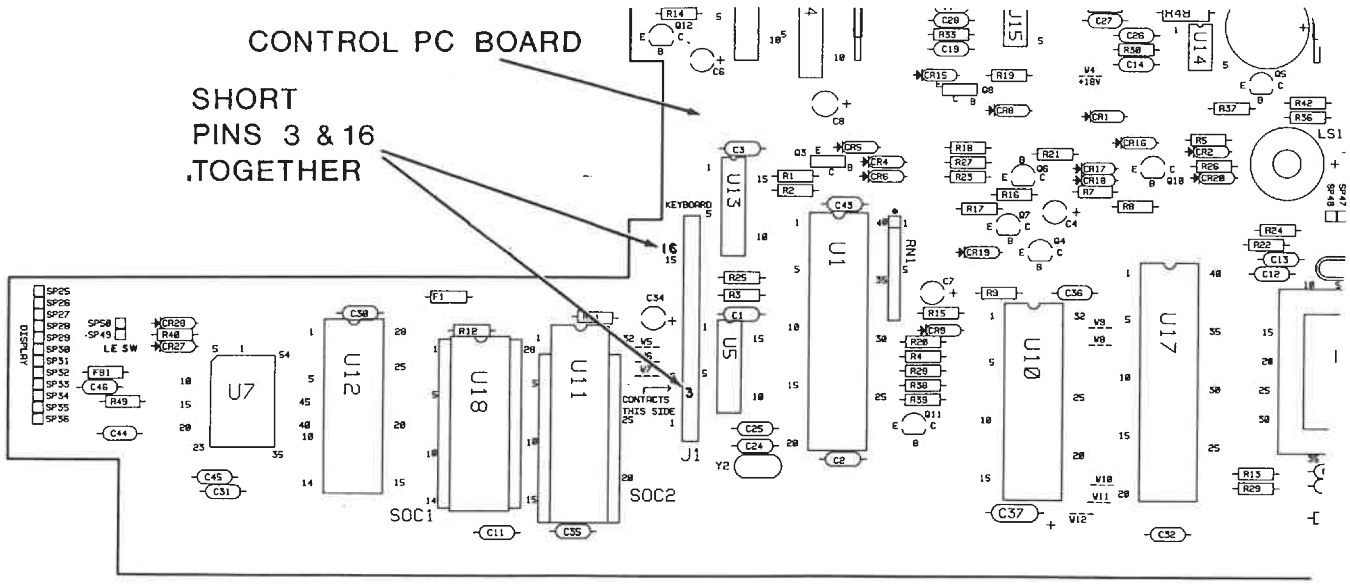
Read this display as follows: 2 affects 3; 3 & 4 affect no other adjustment;
3 depends on 2 being correct.

ENERGIZING ELEMENT MOTOR FOR ADJUSTMENTS: Two adjustments require energizing the Element Motor. To energize the Element Motor, hold down the "E" Keybutton and with Lid Switch Actuator released (or Lid closed), turn power on. Release the Keybutton: The Element Motor stays energized for one minute. After one minute, the Carrier moves to Space 12 and the Typewriter is ready for typing. This procedure may be repeated as often as necessary to make the adjustment.

SELF TYPING: The machine is equipped with a self typing program in the Electronics. When this program is activated, the machine prints out a line of characters, corrects a few character on the line, and performs a linespace and carrier return. During the third and fourth lines of self typing, the software part numbers are displayed in the LCD as part of an LCD function check. The machine will continue this self typing until power is turned off. Refer to Troubleshooting for a full description of this function.

To enter the Self Typing Mode, insure Lid Switch Actuator is released (or Lid closed) and hold the Return Keybutton down; then turn power on. Release the Keybutton after self typing begins.

If the Keyboard is disconnected from the machine, Self Typing can be entered by shorting together pins 3 & 16 on the Keyboard Connector J1 on the Control PC Board (illustrated below), release Lid Switch Actuator, and turn power on. Remove the wire after Self Typing begins.



1. Left End Switch Adjustment

REQUIREMENT:

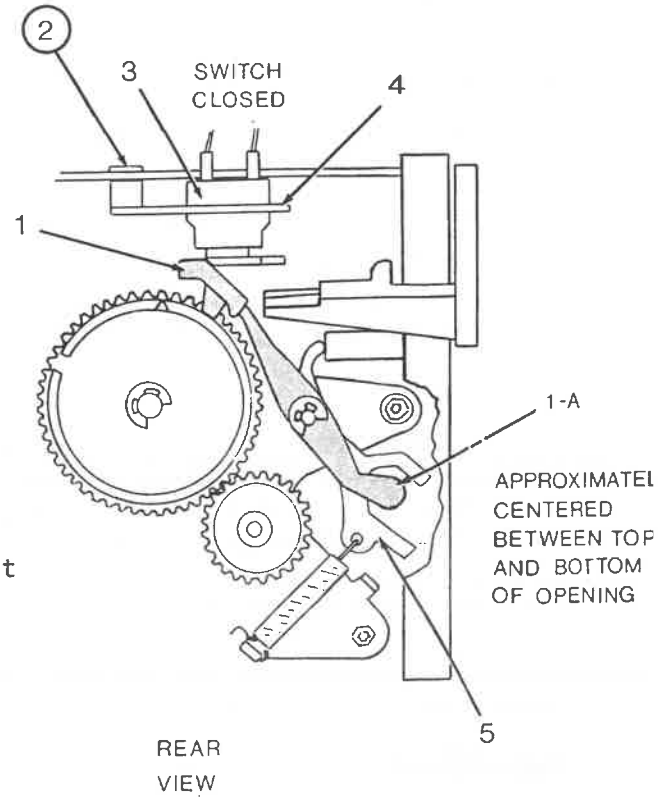
When the Element rotates at the LEFT END SWITCH (3) during initialization, POSITIONER TAIL (1-A) should be approximately centered between the top and bottom of the POSITIONER ACTUATOR (5) Slot opening.

TO CHECK:

Turn Power on. As Element begins to rotate at Left End, turn Power off and check requirement.

ADJUSTMENT:

Loosen Lid Switch SCREW (2), place SWITCH BRACKET (4) in center of adjustment travel slot and tighten. Initialize machine and check requirement. If requirement is not met, loosen SCREW (2) and slightly move Switch Bracket left or right. Tighten Screw and recheck requirement.



FINAL CHECK:

Turn Power On. Carrier should move to Left End; Element should rotate to Home Character (e), and Carrier should move right to Preset Left Margin. Turn Power off.

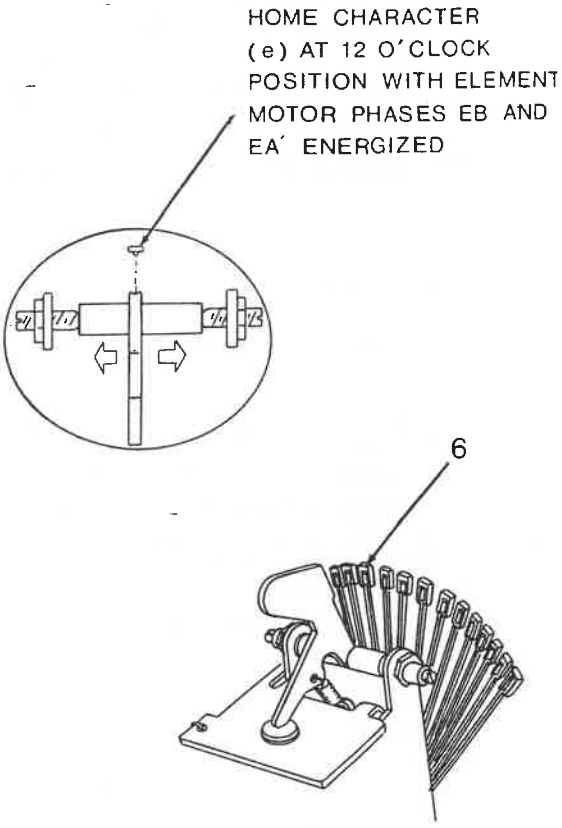
2. Element Motor Position

REQUIREMENT:

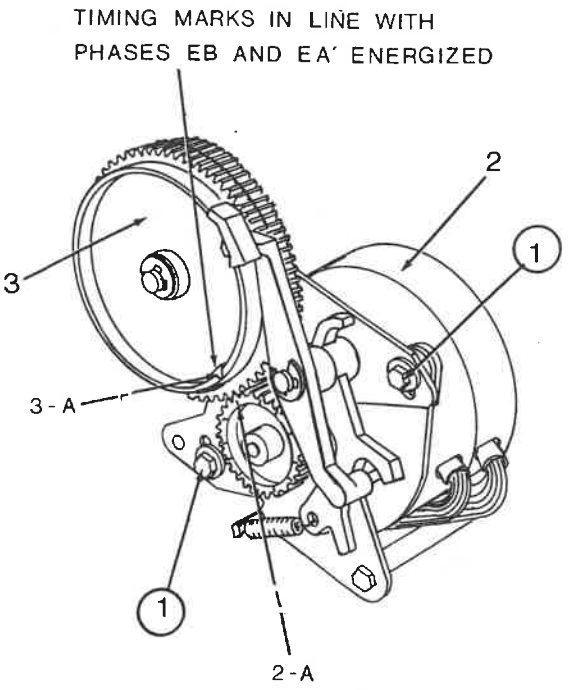
With Phases EB and EA' energized, Element Motor should hold the Home Character (e) ELEMENT PETAL (6) at 12 o'clock position.

TO CHECK:

Hold down the "E" Keybutton, and turn power on to energize the Element Motor for one minute. Home Character Element Petal should be at 12 o'clock position, and parallel with Hammer. Turn power off and repeat this procedure if more time is required.



2. Element Motor Position (continued)



ADJUSTMENT:

1. With power off, loosen two SCREWS (1).
2. Energize Element Motor Phases EB and EA' (refer to "TO CHECK" on page 5-3).
3. Rotate ELEMENT MOTOR (2) so that Home Character (e) Element Petal is at 12 o'clock position. MOTOR TIMING MARK (2-A) may align with TIMING MARK (3-A).
4. Hold Motor in position and tighten upper SCREW (1). Then tighten lower SCREW (1). Check position of Element Petal and fine adjust if necessary. Turn power off.

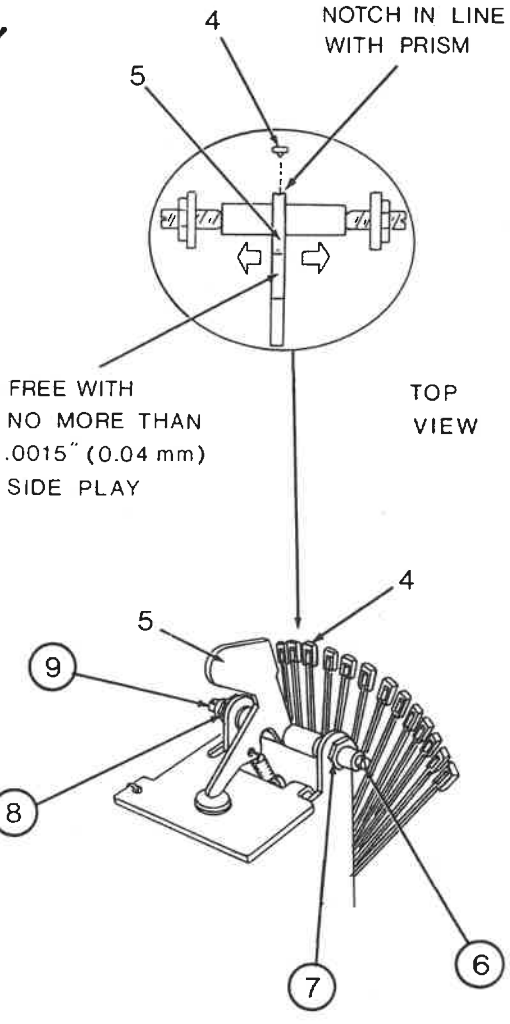
3. Hammer Center Position

REQUIREMENT:

A) With Element Motor Phases EB & EA' energized, notch of HAMMER (5) should align with Prism of ELEMENT PETAL (4).

TO CHECK: Energize Element Motor Phases EB and EA' (refer to Adjustment #2 "TO CHECK" on page 5-3). Manually press HAMMER (5) against ELEMENT PETAL (4). Petal should not move left or right when Notch of Hammer engages Prism of Petal.

B) HAMMER (5) should be free on its pivots with no more than .0015" side play.



ADJUSTMENT:

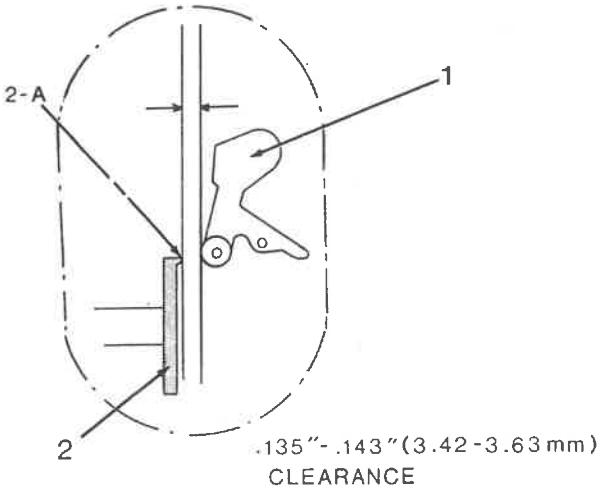
1. Energize Element Motor Phases EB and EA' (refer to Adjustment #2 "TO CHECK" on page 5-3).
2. Remove Ribbon Guide from Hammer Pivot Nuts.
3. Loosen NUTS (7) & (8) and regulate Right PIVOT SCREW (6) to meet Requirement A; tighten Right NUT (7).
4. Hold Hammer against Right PIVOT SCREW (6), and regulate Left PIVOT SCREW (9) to meet Requirement B; tighten Left NUT (8).
5. Replace Ribbon Guide onto Hammer Pivot Nuts.

LEFT SIDE VIEW

4. Hammer Assembly Position

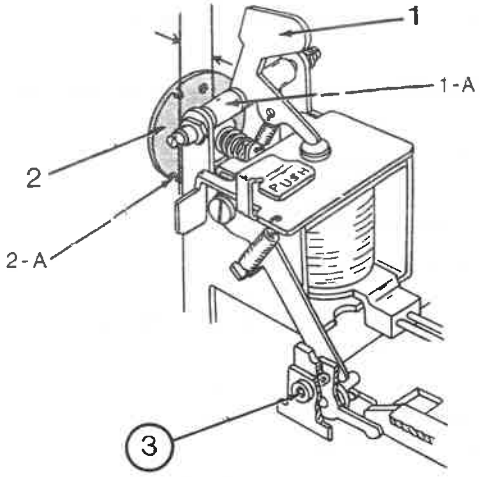
REQUIREMENT:

With HAMMER ASSEMBLY (1) latched in print position, there should be .135"-.143" (3.42-3.63 mm) clearance between Rear of HAMMER SHAFT (1-A) and ELEMENT DRIVER PADS (2-A). Check with Print Element and Ribbon Guide removed.



ADJUSTMENT:

1. Loosen RETRACTOR BRACKET SCREW (3).
2. Rotate ELEMENT DRIVER (2) so that one pad is opposite Hammer Shaft.
3. With HAMMER ASSEMBLY (1) latched in print position, insert a .139" Shim between HAMMER SHAFT (1-A) and DRIVER PAD (2-A).
4. Hold HAMMER ASSEMBLY (1) against Shim, and tighten SCREW (3).
5. Replace Ribbon Guide and Print Element.



5. Ribbon Guide Position

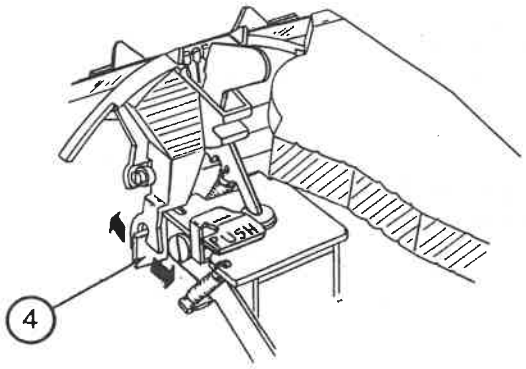
REQUIREMENT:

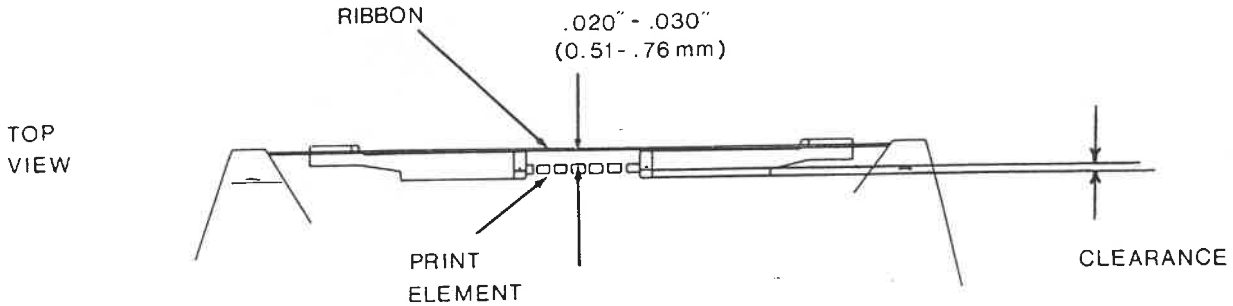
With a Ribbon Cassette in place, there should be .020"-.030" clearance between the Ribbon and the typeface of the Print Element.

NOTE: This should provide clearance between the Print Element and the inside surface of the Ribbon Guide.

ADJUSTMENT:

Form Hammer Solenoid EAR (4) forward or rearward to position Ribbon Guide.

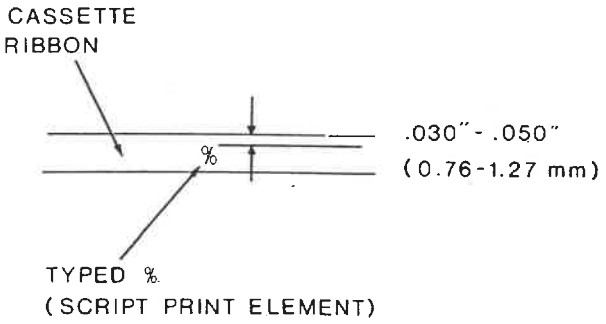




6. Cassette Ribbon Position

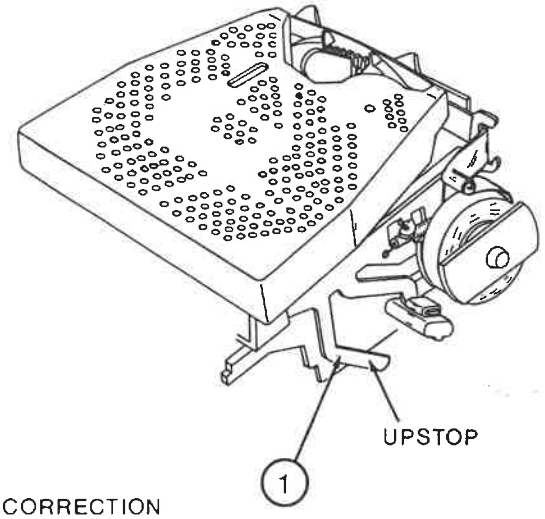
REQUIREMENT:

When typed with a Script Print Element, the top of the "%" character should be .030"-.050" from the top of the Cassette Ribbon.



ADJUSTMENT:

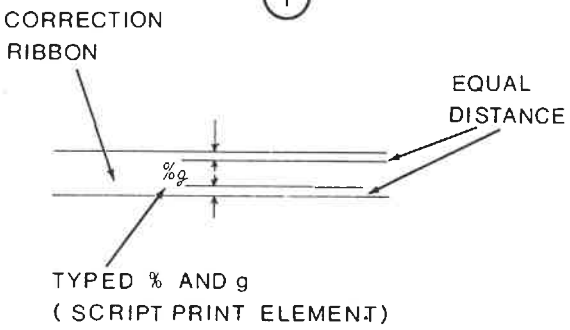
Form DOWNSTOP TAIL (1) on Correction Lift Bail up or down.



7. Correction Ribbon Lift

REQUIREMENT:

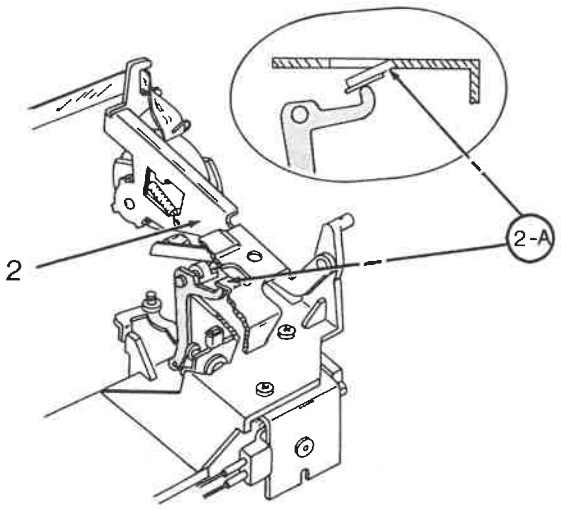
When correcting with a Script Print Element, the distance between the top of the "%" character and the top of the correction ribbon should equal the distance between the bottom of a lower case "g" and the bottom of the correction ribbon.



ADJUSTMENT:

Form ARM (2-A) on CORRECTION LIFT BAIL (2).

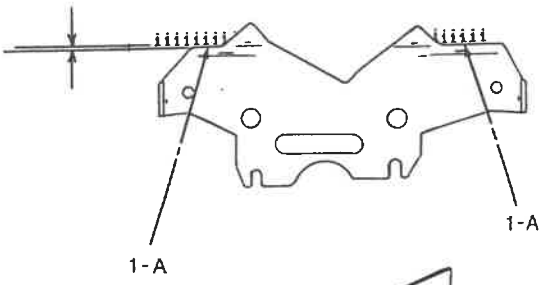
NOTE: Be sure Correction Lift Bail Upstop does not restrict motion of Bail.



8. Line Indicator Position

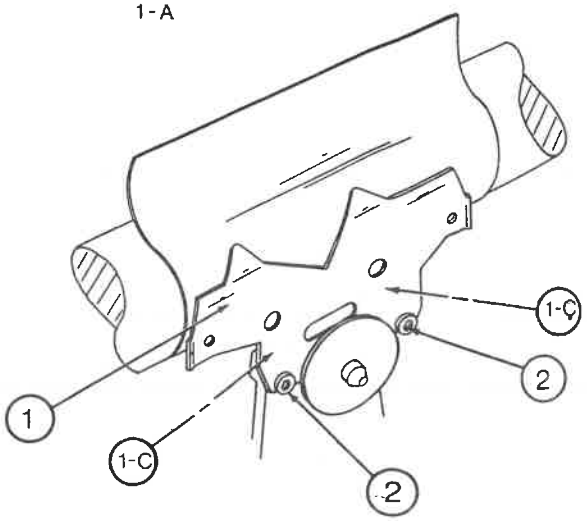
REQUIREMENT:

LINE INDICATOR SURFACES (1-A) should rest .005"-.015" below a row of printed "i's," and should be parallel with the typed characters.



ADJUSTMENT:

Position LINE INDICATOR (1) with attaching SCREWS (2).



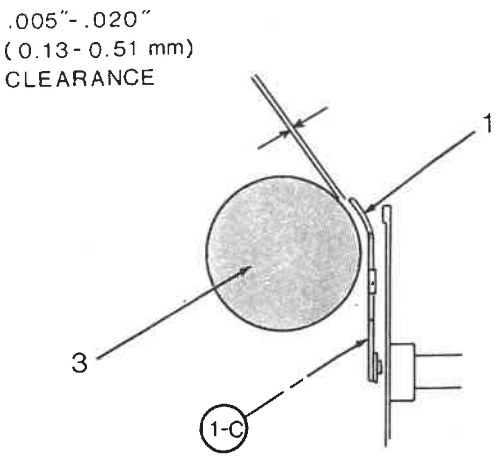
9. Line Indicator Clearance from Platen

REQUIREMENT:

There should be .005"-.020" clearance between LINE INDICATOR (1) and PLATEN (3).

ADJUSTMENT:

Form Left and Right LINE INDICATOR SURFACES (1-C) forward or rearward.



LEFT SIDE VIEW

SECTION 6

TROUBLESHOOTING

INDEX

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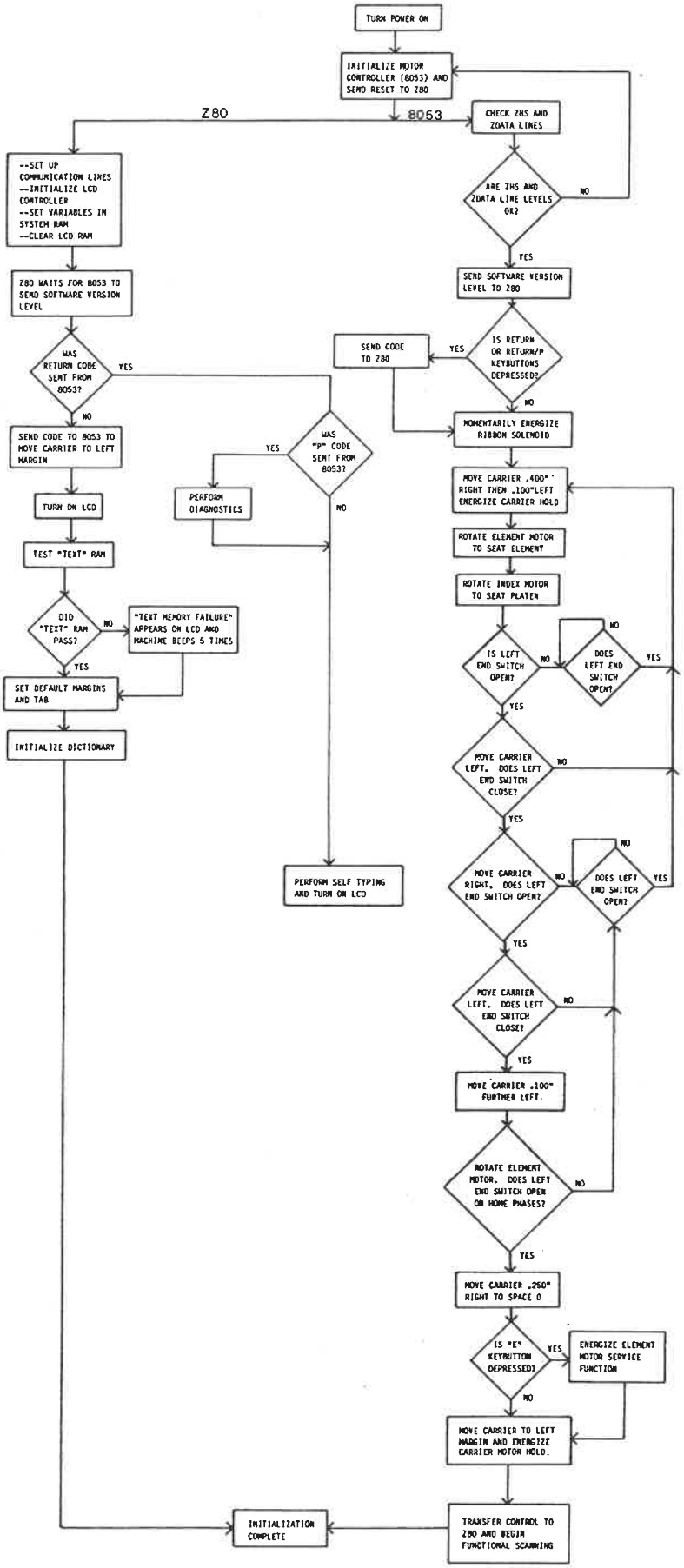
INITIALIZATION FLOW CHART



INITIALIZATION SEQUENCE

The sequence of events which occur during initialization is described below. Understanding this process enables the technician to compare what does happen with what should happen, which can often lead to quick diagnosis of a problem.

1. When the Power Switch is turned on, the Motor Controller (8053) initializes, and it Resets the Memory Controller (Z80). Also, the Watchdog Circuit begins to monitor the Motors and Solenoids.

2. At this point the initialization process is divided between the Motor Controller (8053) and the Memory Controller (Z80).

3. The Motor Controller (8053) performs the following sequences:

   A) The 8053 checks ZHS and Z Data line levels. If these are not okay, initialization starts over.

   B) The 8053 sends Software Version Level to the Z80.

   C) The Motor Controller checks if the Return or Return/P Keybuttons are depressed, and if so, the 8053 sends the Code to the Z80.

   D) The Ribbon Solenoid momentarily energizes to insure the Ribbon Mechanism is reset.

   E) The Carrier moves .400" to the right to assure that the Element Home Positioner is not holding the Left End Switch closed, and then moves .100" to the left.

   F) The Electronics applies holding current to the Carrier Motor phases to stabilize the Carrier Motor Shaft.

   G) The Element Motor Shaft rotates quickly to snap the Element onto the Drive Disc (a maximum of 2 1/2 revolutions).

   H) The Index Motor Shaft rotates for 1/2 forward linespace and then 1/2 reverse linespace to make sure the Drive Gears, Pinion, and Platen Gear are seated properly.

   I) The Electronics checks if the Left End Switch is open. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

   J) The Carrier moves left for a maximum of four seconds to check the closing of the Left End Switch. If the Left End Switch never closes, the Initialization Sequence repeats itself every four seconds until the switch is closed or power is turned off.

   K) The Carrier moves .100" to 1.00" to the right and the Electronics checks if the Switch opens. If the Switch is closed, the Electronics holds the Carrier stable until the Switch opens, and then begins initialization again.

   L) The Carrier moves to the left until the Left End Switch closes, and then another .100" to the left.

3. The Motor Controller (continued)

M) The Electronics energizes the Element Motor counterclockwise for up to 2.7 revolutions. When the ear on the Element Home Positioner drops into the notch on the Rear Scissors Gear under Spring Tension, the Left End Switch opens. The Electronics stops shaft rotation and checks that the Left End Switch opened on the Element home phases. If the Left End Switch does not open, the Electronics holds the Carrier stable until the switch opens. If the Switch does not open when the proper Element Motor phases are turned on, the initialization sequence repeats until this does occur, or until power is turned off.

N) Carrier moves approximately .250" to the right. This new location is reference position Zero.

O) The Electronics checks to see if the "E" Keybutton is depressed for the Element Service Function. If so, the Electronics energizes the Element Motor for approximately one minute.

P) If "E" Keybutton is not depressed, the 8053 moves the Carrier to the Left Margin and energizes the Carrier Motor hold.

Q) The 8053 initialization is now complete.

R) The 8053 now transfers operational control to the Z80 and begins functional scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

4. The Memory Controller Z80 performs the following sequences while the 8053 is performing its sequences:

A) The Z80 sets up communication lines between it and the 8053; initializes the LCD Controller; sets the variables in the System RAM, and clears the LCD RAM to insure no erroneous data is present.

B) The Z80 waits for the 8053 to send the Software Version Level.

C) The Z80 checks to see if the Return or Return/P Code was sent from the 8053. If Return Code was sent, the Z80 instructs the 8053 to perform Self Typing. If Return and P Code was sent, the Z80 instructs the 8053 to perform the Diagnostic Tests. Z80 initialization stops at this step when doing the Self Typing or Diagnostics.

D) If no Return Code was issued by the 8053, the Z80 sends code to tell the 8053 to move the Carrier to the Left Margin (Space 12).

E) The LCD turns "On."

F) The Z80 writes Test TEXT data to the "TEXT" RAM and then reads this data. If the TEXT data is correct, the next step occurs. If not, "TEXT MEMORY FAILURE" appears on the LCD, and the machine beeps five times before the next step.

G) The Z80 sets the 10 pitch default Margins and Tab.

H) The Dictionary initializes.

I) The Z80 initialization is complete and the Z80 has control over all future operations except scanning of the Keyboard, Keypad, Left End Switch, and Mode Selector Switch.

5. Once 8053 and Z80 initialization are both complete, the machine initialization is complete.

TROUBLESHOOTING GUIDE FOR ELECTRICAL PROBLEMS

This Troubleshooting Guide provides probable causes for some specific machine problems. There is no intent to cover every possible thing that could go wrong. Since electrical problems may cause a machine failure during initialization, the technician should read and thoroughly understand the preceding section on the Initialization Sequence.

OBSERVE STATIC PRECAUTIONS

IMPORTANT: When working with static sensitive devices, such as the LCD and Printed Circuit Boards, be sure to observe static precautions to prevent damage to these devices.

GENERAL TROUBLESHOOTING TECHNIQUES

-- Look for the obvious (broken wires, unplugged connectors, etc.)

-- Check the problem part first, and then logically limit the possibilities through all associated wiring, connectors, and circuit boards.

-- Check mechanical functions for freeness, lubrication, and proper operation.

-- Check standard adjustments.

Diagram Reference Symbol

7B-1 Indicates appropriate diagram page number.

WATCHDOG CIRCUIT

The Watchdog Circuit is a safety circuit that monitors the length of time that the Ribbon Solenoid, Hammer Solenoid, and Carrier Motor are energized. If the above components remain energized longer than normal, the Watchdog Circuit forces the Slave Microprocessor (8053) to reset and try to reinitialize the machine.

To disable the Watchdog Circuit for troubleshooting purposes, short point "A" of Diode CR19 to ground. If not disabled, the Watchdog Circuit forces the Slave (8053) Microprocessor to continually reset.

CONTROL BOARD CONNECTIONS

When troubleshooting the PWP, it is not necessary to have the LCD and Disk Drive connected to the Control PC Board. Also, if the PWP initializes correctly without these components, but not when they are connected, a problem exists in either the LCD or Disk Drive. Likewise, Keyboard, Cursor Keypad, and Mode Switch do not have to be connected to the PC Boards either. When the Mode Switch is disconnected, the PWP defaults to the typewriter mode.

OBSERVE STATIC PRECAUTIONS

SYMPTOM: MACHINE APPEARS TOTALLY DEAD

LCD is blank, and Carrier does not move at all

Probable Causes:
1) .75 Amp Fuse (Slo-Blo)
2) Transformer
3) AC Input Receptacle
4) Power Switch
5) Power Cord
6) Control PC Board
7) ROM U11 Defective

How to Isolate Problem

A) If Fuse is not blown, check the Transformer primary circuit as follows: With machine un-plugged, detachable Cord in place, and Power Switch turned "On," use an Ohmmeter to measure resistance between the Hot and Neutral Prongs of the Power Cord. The reading should be approximately 9.9 ohms. [7B-1]

If the measured resistance is correct, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section. If not, check the Power Cord, Fuse, AC Input Receptacle, and Power Switch: Replace defective parts. If these parts are good, replace the Transformer.

If the Fuse was blown, isolate the fault as follows:

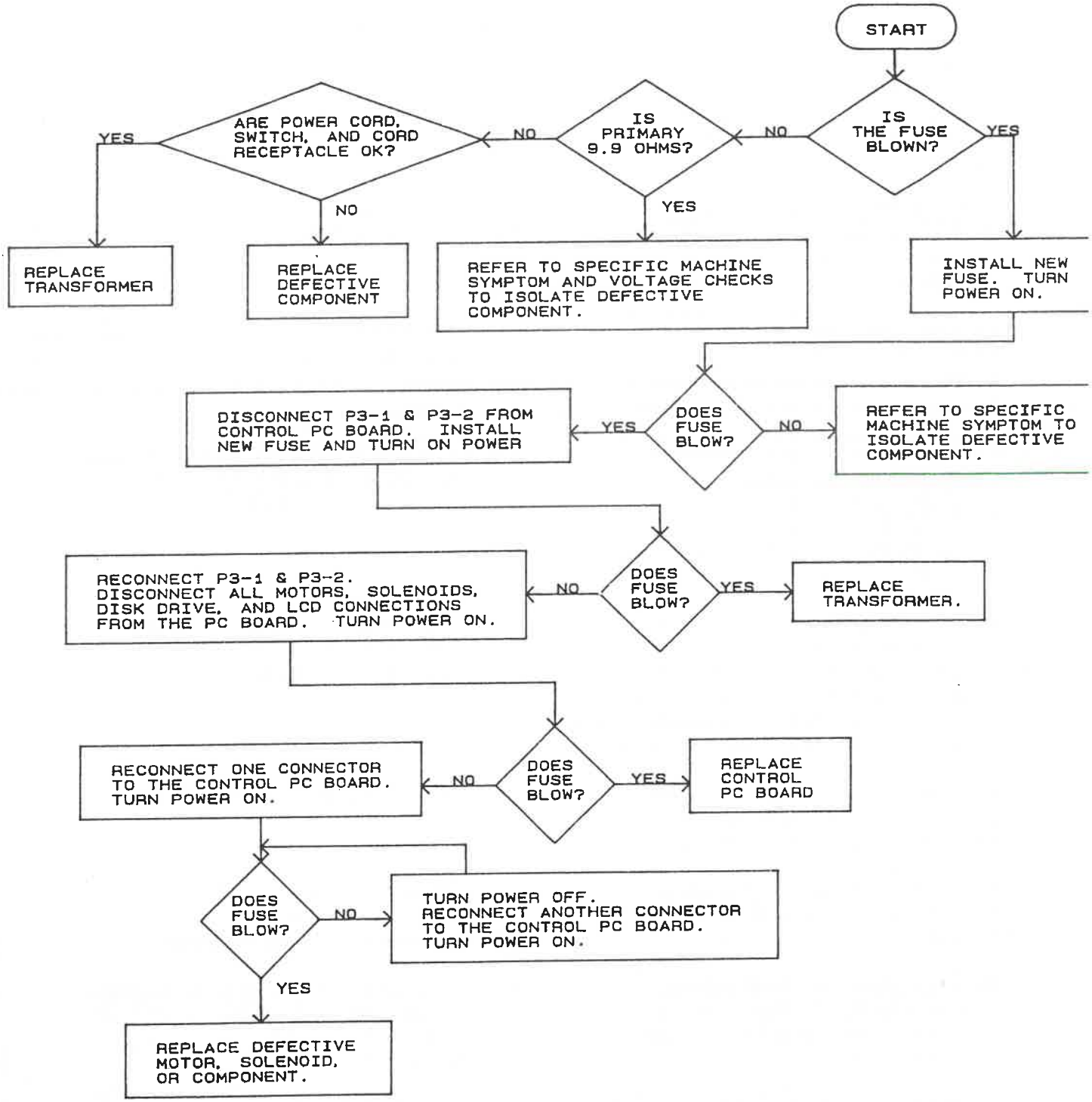
1. Install a new fuse and turn power on. If the fuse does not blow right away when power is turned on, refer to the specific symptom the machine exhibits listed later in the Troubleshooting section to determine which component may have caused the fuse to blow.

2. If the fuse did blow in Step A-1, turn power off and disconnect Transformer Connectors P3-1 & P3-2 from the Control PC Board. Install a new fuse, and turn power on. If the fuse blows, there's a short in the Transformer circuit. Replace Transformer.

3. If the fuse did not blow in Step A-2, turn power off. Plug Transformer Connectors P3-1 & P3-2 back into the Control PC Board, disconnect all Motor, Solenoid, Disk Drive, and LCD Connectors from the Control PC Board, and turn power on. If the fuse blows, there's a short on the Control PC Board. Replace Control PC Board.

   If the fuse does not blow, turn power off; reconnect one Connector to the Control PC Board. Turn power on. If the fuse blows now, there's a short in that Component. Replace defective Component. If it does not blow, use the process of elimination to determine which unplugged component (LCD, Disk Drive, Motors, or Solenoids) is shorted, and replace it.

MACHINE TOTALLY DEAD


START
IS THE FUSE BLOWN?
YES
NO
IS PRIMARY 9.9 OHMS?
NO
YES
ARE POWER CORD, SWITCH, AND CORD RECEPTACLE OK?
NO
YES
REPLACE TRANSFORMER
REPLACE DEFECTIVE COMPONENT
REFER TO SPECIFIC MACHINE SYMPTOM AND VOLTAGE CHECKS TO ISOLATE DEFECTIVE COMPONENT.
INSTALL NEW FUSE. TURN POWER ON.
DOES FUSE BLOW?
YES
NO
DISCONNECT P3-1 & P3-2 FROM CONTROL PC BOARD. INSTALL NEW FUSE AND TURN ON POWER
REFER TO SPECIFIC MACHINE SYMPTOM TO ISOLATE DEFECTIVE COMPONENT.
DOES FUSE BLOW?
NO
YES
RECONNECT P3-1 & P3-2. DISCONNECT ALL MOTORS, SOLENOIDS, DISK DRIVE, AND LCD CONNECTIONS FROM THE PC BOARD. TURN POWER ON.
REPLACE TRANSFORMER.
DOES FUSE BLOW?
NO
YES
RECONNECT ONE CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE CONTROL PC BOARD
DOES FUSE BLOW?
NO
YES
TURN POWER OFF. RECONNECT ANOTHER CONNECTOR TO THE CONTROL PC BOARD. TURN POWER ON.
REPLACE DEFECTIVE MOTOR, SOLENOID, OR COMPONENT.

SYMPTOM: MACHINE FAILS TO COMPLETE INITIALIZATION OR REPEATS INITIALIZATION

When checking initialization, move Carrier to the center of the machine, and turn Power Switch on. Use the following guide to determine the cause of the failure. Refer to the Wiring Diagram. 7B-1

SYMPTOM	PROBABLE CAUSE
Element Motor rotates, Carrier does not move, LCD is dark, Platen wiggles approximately every 3 seconds. Contrast control operates normally.	1) Carrier Motor Connector disconnected. 2) Control PC Board--Carrier Motor Circuit bad.
Element Motor doesn't rotate. Machine tries to initialize and repeats this until power is turned off.	1) Element Motor Connector disconnected 2) Control PC Board--Element Motor Circuit bad.
Carrier vibrates against Left Side Frame, then tries to reinitialize approximately every 4 seconds.	1) Left End Switch or switch connection is always open. 2) Control PC Board--Left End Switch Circuit bad.
Carrier moves right about .4"; Element rotates; Carrier moves right again about .8" and stays there. LCD is dark blue. Contrast control works.	1) Left End Switch is always closed. 2) Control PC Board--Left End Switch Circuit bad.
Platen wiggles, Carrier moves right approximately .4", Element rotates, Carrier chatters, pauses, Carrier repeatedly chatters approximately every 4 seconds. LCD is dark. Contrast control works.	1) Carrier Motor Phase is open. 2) Control PC Board--Carrier Phase Circuit bad.
Machine initializes up to the point that the Copyright Message is displayed on LCD.	1) ROM U18 is defective. 2) Defective Control PC Board.
Machine does not initialize, but LCD is dark blue and EL Panel is lit.	1) ROM U11 and U18 are in wrong sockets (reversed). 2) Defective Control PC Board.
Machine does not initialize, LCD is blank, EL Panel is not lit, all Power Supply voltages are very low.	1) Transformer secondary connectors are on the wrong post header of Control PC Board. 2) Transformer is defective.
Element Motor noisy and sluggish during initialization. Strobing occurs during printing.	1) Element Motor Phase is open. 2) Control PC Board--Element Phase Circuit is bad.

LCD & EL PANEL PROBLEMS 7B-1

SYMPTOM	PROBABLE CAUSE
LCD is dark blue and no contrast control. EL Panel is lit.	1) No -13 VDC to LCD--Open -13V line in LCD Cable. 2) Defective LCD or Control PC Board.
Image on right half of LCD is clear. Image also shows on left half, but is distorted. EL Panel is lit.	1) D1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Image on left half of LCD is clear. Image also shows on right half, but is distorted.	1) D2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is blank; EL Panel is lit; and no contrast control.	1) FLM Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is completely blank; no contrast control.	1) LCD Cable Connector is reversed on on Control PC Board or LCD.
Slight loss of contrast on LCD. EL Panel is lit.	1) MB Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue, no contrast. EL Panel is lit.	1) CL1 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD is dark blue with vertical lines, Contrast control works. EL Panel is lit.	1) CL2 Line on LCD Cable open. 2) Defective LCD or Control PC Board.
LCD flickers various block patterns and poor contrast control. EL Panel is lit.	1) +5 VDC Line on LCD Cable open. 2) Defective LCD or Control PC Board.
Very narrow range or no contrast control. EL Panel is lit. Image is normal.	1) Defective Contrast Potentiometer on LCD. 2) Defective LCD.
LCD is dark, but Characters on LCD are okay, EL Panel does not light. Contrast control works.	1) No 120 VAC output from DC/AC Inverter. 2) Defective EL Panel. 3) 18 V line on LCD Cable open. 4) Defective Control PC Board. 5) Ground Line on LCD Cable open. 6) Defective EL Panel Pico Fuse F1.

DISK DRIVE PROBLEMS 7B-1

SYMPTOM	PROBABLE CAUSE
LCD indicates "Disk Not Loaded" when options 4-7 are selected, but a Disk is in the Disk Drive.	1) Disk Drive Cable Connector is reversed on Control PC Board or Disk Drive.
Disk Drive runs continuously when a Disk Function is selected. Unable to get the Directory.	1) Ready Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
LCD indicates "Disk Not Loaded" when Disk is loaded in the Disk Drive.	1) $\overline{\text{Media}}$ Line on Disk Drive Cable is open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" occurs during any Disk Drive function.	1) WRGA Line on Disk Drive Cable open. 2) RDDT Line on Disk Drive Cable open. 3) Defective Disk Drive or Control PC Board.
Occasional "Disk Read Error" occurs during Disk Drive function.	1) $\overline{\text{DRESET}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
"Disk Read Error" and Disk in Disk Drive is erased.	1) $\overline{\text{WRDT}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
Disk Drive Motor does not function and PWP Menu options 4-8 fail to operate.	1) $\overline{\text{MTON}}$ Line on Disk Drive Cable open. 2) No +6.5 volts to Disk Drive. 3) Defective Disk Drive or Control PC Board.
"Disk Write Protected" error when Disk in Drive is not "Write Protected."	1) $\overline{\text{WRPR}}$ Line on Disk Drive Cable open. 2) Defective Disk Drive or Control PC Board.
PWP initializes, but no Disk Drive functions operate.	1) No +5 volts to Disk Drive. 2) Defective Disk Drive or Control PC Board.

MISCELLANEOUS 7B-1

SYMPTOM	PROBABLE CAUSE
Machine completes initialization; Typewriter Mode is normal, but Word Processing Mode cannot be selected.	1) Mode Selector Switch. 2) Defective Control PC Board.
Prints wrong characters or strobes (Hammer strikes between Print Element Petals).	1) Defective or incorrectly adjusted Left End Switch (Adj. #1). 2) Incorrect Element Motor Position (Adj. #2). 3) Incorrect Hammer Center Position (Adj. #3). 4) Broken Disc on Element Drive Shaft or binding Element Drive Shaft. 5) Linefinder or Ribbon Guide interferes with Print Element. 6) Improper Element Scissors Gear tension. 7) Inside Scissors Gear slips on Element Drive Shaft. 8) Defective Element Motor. 9) Defective Control PC Board.
Index Motor vibrates noisily and fails to linespace.	1) Open or shorted windings in Index Motor. 2) Defective Control PC Board.
Hammer or Ribbon Drive Solenoid fails to fire.	1) Defective Solenoid. 2) Defective Control PC Board.
Beeper fails to beep.	1) Defective Beeper. 2) Defective Control PC Board
Left Margin changes.	1) Felt Wipers on Carrier Rear Rail require lubrication. 2) Mechanical interference with Carrier movement. 3) Defective Control PC Board.
Poor vertical correction registration.	1) Linefinder binding on Platen. 2) Paper Feed Rollers binding. 3) Platen binding.
Correction Ribbon too slack (blouses).	1) Defective Brake Spring. 2) Defective Helper Spring on Brake Spring.
Correction Ribbon lifts during normal printing	1) +36 VDC on +18 VDC line from DC Power Supply of Control PC Board (Check Q13 on PC Board).

OBSERVE STATIC PRECAUTIONS

RESISTANCE AND VOLTAGE CHECKS

Use the following Resistance and Voltage Check Charts when troubleshooting problems with electrical components. With Volt/Ohmmeter probes on specified pins of the connector, the resistance or voltage readings should read approximately at the values given in the charts. NOTE: Readings may vary between Volt/Ohmmeters. Refer to the Wiring Diagrams in the Diagrams Section for connector and pin locations.

RESISTANCE CHECKS

All Resistance Checks must be made with the Power OFF and the appropriate connector unplugged from the Control PC Board.

Refer to page 7B-1 to identify connectors.

COMPONENT	CONNECTOR	PIN NUMBERS	APPROXIMATE RESISTANCE
Element Motor	P-ELE		
COM and A		3 & 1 or 4 & 1	24 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	24 ohms ± 7%
A and A'		1 & 2	48 ohms ± 7%
COM and B		3 & 6 or 4 & 6	24 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	24 ohms ± 7%
B and B'		5 & 6	48 ohms ± 7%
Carrier Motor	P-CAR		
COM and A		3 & 1 or 4 & 1	50 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	50 ohms ± 7%
A and A'		1 & 2	100 ohms ± 7%
COM and B		3 & 6 or 4 & 6	50 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	50 ohms ± 7%
B and B'		5 & 6	100 ohms ± 7%
Index Motor	P-IND		
COM and A		3 & 1 or 4 & 1	50 ohms ± 7%
COM and A'		3 & 2 or 4 & 2	50 ohms ± 7%
A and A'		1 & 2	100 ohms ± 7%
COM and B		3 & 6 or 4 & 6	50 ohms ± 7%
COM and B'		3 & 5 or 4 & 5	50 ohms ± 7%
B and B'		5 & 6	100 ohms ± 7%
Ribbon Solenoid	P-RSOL	1 & 2	9.60 ohms ± 1 ohm
Hammer Solenoid	P-HSOL	1 & 2	1.98 ohms ± .2 ohm
Left End Switch	P-LES	1 & 2	0 Ohms when closed; Infinite (∞) ohms when open
Transformer Primary	AC Plug (Switch must be turned on)	Prongs	Approximately 10 ohms
Transformer Secondaries	P3-1 (Blue Wires)	1 & 2	Approximately 10 ohms
	P3-2 (Red Wires)	1 & 2	Less than 1 ohm

CAUTION: Whenever performing checks with power on, take care not to short two points together with the Voltmeter probes. Damage will occur to the Power Supply Circuits.

DC VOLTAGE CHECKS

All DC Voltage checks must be made with Connectors in place and Power On. Set Voltmeter for DC Volts and appropriate voltage range. With Power Off, attach common probe of Voltmeter to Power Supply Ground Reference Point 7C-1, and touch the other probe to the Check Point listed in the Chart. Turn Power On, allow machine to initialize, and take readings (Idle State). Refer to the appropriate Diagrams Section for Connector locations. 7B-1 7C-1

COMPONENT	CHECK POINT	LOCATION	APPROX. DC VOLTAGE
CONTROL PC BOARD: 7C-1			
RIBBON SOLENOID	P-RSOL	PINS 1-2	+18 VDC
HAMMER SOLENOID	P-HSOL	PINS 1-2	+18 VDC
ELEMENT MOTOR	P-ELE	PINS 1-6	+18 VDC
INDEX MOTOR	P-IND	PINS 1-6	+18 VDC
CARRIER MOTOR	P-CAR	PINS 1-6	+.7 or +4.2 VDC
NOTE: Voltage reading depends upon location of the Carrier Rotor during holding current.			
+5 VDC	5 VOLT TEST POINT	(W2)	+4.75 TO 5.25 VDC
+6.5 VDC	6.5 VOLT TEST POINT	(W3)	+6.07 TO 6.92 VDC
+18 VDC	18 VOLT TEST POINT	(W4)	+16.83 TO 19.17 VDC
-13 VDC	-13 VOLT TEST POINT	(W1)	-12.5 TO -13.5 VDC
LE/LID SWITCH (W/SWITCH OPEN)	P-LES	PIN 1 PIN 2	0.0 VDC +4.9 VDC
LE/LID SWITCH (W/SWITCH CLOSED)	P-LES	PIN 1 PIN 2	0.0 VDC 0.0 VDC
TW/WP MODE SWITCH (TW POSITION)	P-MODE	PIN 1 PIN 2	+4.9 VDC 0.0 VDC
TW/WP MODE SWITCH (WP POSITION)	P-MODE	PIN 1 PIN 2	0.0 VDC 0.0 VDC
LCD CONNECTOR			
+5 VDC	P-LCD	PIN 6	+4.75 TO 5.25 VDC
-13 VDC	P-LCD	PIN 4	-12.5 TO -13.5 VDC
+18 VDC	P-LCD	PIN 2	+16.83 TO 19.17 VDC
DISK DRIVE CONNECTOR			
+5 VDC	P-DISK	PIN 11	+4.75 TO 5.25 VDC
+6.5 VDC	P-DISK	PIN 2	+6.07 TO 6.92 VDC
BRIDGE RECTIFIER DC OUTPUT			
+36 VDC	C17	LEFT SIDE	APPROX. 36 VDC

AC VOLTAGE CHECKS

Make AC Voltage checks with Connectors in place and power on. Set Voltmeter for AC Volts and appropriate voltage range. Touch probes to points listed below. 7B-1 7C-1

CHECK	CHECK POINTS	APPROX. VOLTAGE
TRANSFORMER INPUT	CHECK LINE VOLTAGE AT POWER OUTLET	LINE VOLTAGE (117 VAC) ± 10%
TRANSFORMER OUTPUTS	P3-1, PINS 1 & 2 (BLUE WIRES)	17 TO 23 VAC
	P3-2, PINS 1 & 2 (RED WIRES)	25.5 TO 38.5 VAC
DC/AC VOLTAGE INVERTER OUTPUT	INVERTER OUTPUT PINS	120 VAC (APPROX.)

KEYBOARD SERVICE DIAGNOSTICS AT POWER UP

Several Keybuttons activate service functions and diagnostics when they are depressed and held down during initialization. To activate any of these functions, depress and hold down the Keybutton until after the Element homes during initialization. Jackets should be in place and deck closed. Release the Keybutton when the Service Function begins. NOTE: Mode Switch can be in either Word Processor or Type Mode.

OBSERVE STATIC PRECAUTIONS

If the Keyboard is disconnected from the machine, Service Functions can be entered by shorting the appropriate Keyswitch Row and Column pins on Keyboard Connector J1. Remove the jumper after the Service Function begins. Refer to the appropriate Keyboard Layout Chart and Matrix Diagram to determine which Row and Column should be shorted to perform the Service Function. 7A-2 7A-3

KEYBUTTON	FUNCTION
RETURN	Initiates Self Typing, checks LCD function, and displays the part numbers of the Motor Control, Memory Control, and Dictionary Software installed on the Control PC Board. When this function starts, the LCD turns completely dark. The machine prints out a line of characters, corrects some in the middle line, and then performs a linespace and carrier return. On the second line, the LCD turns completely light, and the machine repeats the Self Typing and correcting it did on the first line. On the third line, the LCD background remains light, and the Motor Control, Memory Control, and Dictionary Software part numbers are displayed in the center of the LCD. Self Typing continues as on previous lines. On the fourth line, a dark border is added to the previous display on the LCD, and Self Typing continues. After the fourth line, the display turns dark, and the cycle repeats until power is turned off.
"E"	Carrier stops at Space 0 and the Electronics energizes Element Motor phases EB and EA' for one minute to make adjustments. After one minute, the Carrier moves to the Left Preset Margin and the machine enters the Typewriter or Word Processor Mode, depending on Mode Switch selection.
RETURN & P	Initiates a series of Diagnostic Tests that are performed by the electronics of the typewriter. These tests include: 1) Keyboard & Keypad Test, TW/WP Switch Test 2) CRC Generator Test 3) RAM Test 4) ROM Test 5) Disk Drive Test 6) Self Typing

A description of each test and error messages are on the following pages.

1) KEYBOARD, KEYPAD, AND TW/WP MODE SWITCH TEST

With the Return and P Keybuttons depressed and power turned on, the machine initializes and a graphic display of all the Keybuttons of the Keyboard and Keypad, plus TW & WP for the Mode Switch, appear on the LCD.

When each Keybutton is depressed, the corresponding character disappears from the LCD because the electrical circuit for that character is completed. If the character remains on the LCD, the Keyswitch did not close the circuit, and the cause should be determined (i.e. Bad Flexible Circuit, Molded Dome Switch, etc.).

After all Keybuttons disappear from the LCD, move the TW/WP Mode Switch three times to delete TW and WP from the LCD and initiate the next test (CRC Generator). If all Keybuttons are not deleted from the LCD prior to moving the TW/WP Mode Switch, the LCD indicates a "KEYBOARD FAILURE" and stops further testing.

If the Keyboard/Keypad Test is not required, simply move the TW/WP Mode Switch three times, and depress the "S" Keybutton to skip the Keyboard Test. NOTE: To skip any other test after the Keyboard Test, just depress the "S" Keybutton and the next test automatically begins.

2) CRC GENERATOR TEST

This test checks the CRC Generator in the ASIC chip. If the Generator is defective "CRC GEN. FAILURE" appears on the LCD and no further test can be performed. If the Generator is okay, the next test automatically begins.

3) RAM TEST

The RAM Test performs a check on RAM Bank 1 and RAM Bank 2. If RAM is okay, the next test automatically begins. If a "RAM FAILURE" is detected, the following is displayed on the LCD:

RAM FAILURE AAAA:XXYY

Explanation: RAM Chips U8 and U9 are defective. The test does not determine which one; replace both. AAAA is the address in RAM that failed. XX is the expected data, and YY is the data found.

4) ROM TEST

The ROM Test performs a check on Program ROM 0, Program ROM 1, and Dictionary ROM 2. If all ROM's are okay, the next test automatically begins. If a ROM fails, the following is displayed on the LCD:

ROM FAILURE IJ AAAAA:XXYY

Explanation: There are three ROM Chips on the Control PC Board. The test determines the defective ROM by displaying the U number (i.e. 10 represents U10) in the position indicated by IJ on the LCD. AAAAA is the address in ROM where the data is stored. XXYY is the data that should be in ROM. Replace the defective ROM.

5) DISK DRIVE TEST

WARNING - The Disk Drive Test removes all data on Disk being tested. Any files on a Disk used for the Disk Drive Test will be lost. Also, the Disk Drive Test leaves the Directory on the Test Disk blank.

A) The first check determines if a prepared Disk is inserted in the Disk Drive. If one is not inserted, "DISK NOT READY" appears on the LCD. Insert a prepared Disk in the Disk Drive and press Return.

B) Next, the electronics determines if the Disk is Write Protected. If the Disk is, the LCD displays "DISK WRITE PROTECT." Write enable the Disk or insert a different Disk, and then press the Return Keybutton.

C) In the next checks the electronics writes a test pattern, reads the test pattern, and checks the data read from the Disk for accuracy. This sequence is performed twice for a total of six operations. If Disk Drive test is okay, the last test, Self Typing, begins automatically. If an error occurs during the test in Step C, the following is displayed on the LCD:

DISK FAILURE IJ AAAA:XXYY

Explanation: There are many possible error messages that could appear on the LCD. IJ is the Code Field which indicates the detected failure. NOTE: When I is 1, J is not used; therefore, J is represented by 0 (Zero). Also, when I is 1, IJ is followed by AAAA:XXYY. AAAA is the address in RAM Memory that failed. XX is the expected data and YY is the data found. The most probable cause of the Data Compare Error (when IJ is 10) is the Disk Controller (U6 on Control PC Board) cannot write to a Disk.

The IJ Code Field errors are listed below. First determine the I value followed by the J value. For example, if the IJ error displayed was 63, that means there was a failure during a Directory Write because the "Sync" in ID Field could not be found.

```
I -- 1 DATA COMPARE ERROR
     2 FAILURE DURING DISK WRITE
     3 FAILURE DURING DISK READ
     6 FAILURE DURING DIRECTORY WRITE
     7 FAILURE DURING DIRECTORY READ
J -- 0 DISK NOT READY AFTER INITIAL CHECK PASSED
     1 DISK WRITE PROTECT AFTER THE INITIAL CHECK PASSED
     2 NOT USED
     3 "SYNC" IN ID FIELD NOT FOUND (I.E. HAVING
       TROUBLE READING DISK)
     4 DATA MARK IN ID FIELD (I.E. HAVING
       TROUBLE READING DISK)
     5 BAD CRC ON ID FIELD (I.E. DEFECTIVE DISK)
     6 SECTOR NOT FOUND (I.E. DISK NOT PREPARED,
       DEFECTIVE DISK)
     7 DATA SYNC NOT FOUND (I.E. DISK  NOT PREPARED,
       DEFECTIVE DISK)
     8 DATA "DATA MARK" NOT FOUND
     9 DATA CRC IS BAD
```

NOTE: The examples listed above are a few of the most probable faults that could occur. Use the substitution method to isolate the fault to the Disk, Control PC Board, Disk Drive, or Disk Drive Cable.

6) SELF TYPING

After successful completion of the Disk Drive Test, the LCD turns dark and the Carrier starts the Self Typing sequence that is identical to depressing the "Return" Keybutton on power up. This test continues until the machine power is turned off.

KEYBOARD AND CURSOR KEYPAD TROUBLESHOOTING PROCEDURE

NOTE: Refer to the appropriate Keyboard Switch Layout and Matrix Charts. 7A-2 7A-3 7A-4

1. Identify the Matrix Position Number(s) for the Key(s) from the Keyboard Switch Layout Chart (On Models 5DEA or 5DCA, the character "5" is matrix position S6).

2. Identify the Column and Row for that position from the Keyboard Matrix Chart. Then determine Keyboard Connector Pin numbers that correspond with the column and row of the suspect key (i.e. position S6 is tied to Column C5 and Row R0, which correspond to Pins 3 & 14 of the Keyboard Connector).

3. Determine whether the problem is with the Keyboard or Control PC Board as follows:

   A) Remove the Keyboard from the machine under test. Power up the machine to initialize it. Set Mode Switch to Typewriter Mode if Switch is plugged into Control PC Board.

   To check operation of any individual character, simply short the appropriate pins on the Control PC Board Connector J1 to see if that particular character types. For example, if checking the character "5," touch a Jumper Wire between Pins 3 & 14 of Connector J1. This allows the typewriter to type the character "5" and repeat it until the Jumper Wire is removed. If the character fails to type, the problem is in the Control PC Board and replacement is necessary.

   B) If character does type, then there is a Keyboard fault.

4. Diagnose a Keyboard fault as follows:

   A) Touch the one lead of an ohmmeter to the pin on the Keyboard Connector that corresponds with the appropriate Column. Then touch the other lead to the pin on the Keyboard Connector that corresponds with the appropriate Row [i.e. for position S6 touch one lead to Connector P1, Pin 3, (Column C5) and the other lead to Connector P1, Pin 14 (Row R0)].

   NOTE: Since there are no Diodes used with this Keyboard, it makes no difference which ohmmeter lead is touched to the Matrix Column and which one is touched to the Matrix Row.

   B) Depress the Key being checked. If the switch is good, the ohmmeter should indicate less than 1000 ohms resistance. (Readings vary with different meters. To know what the meter should read, take a similar reading on a known good Key Switch in the Keyboard Circuit). If meter indicates an open, replace the Molded Dome Switches.

   C) If there are a definite 7 or 8 characters or functions that do not operate, check to see if those 7 or 8 characters or functions are in the same Column or Row in the Keyboard Matrix. If they are, check all switches in that Column or Row through the Keyboard Connector. If they are bad, replace the Keyboard Flexible Circuit.

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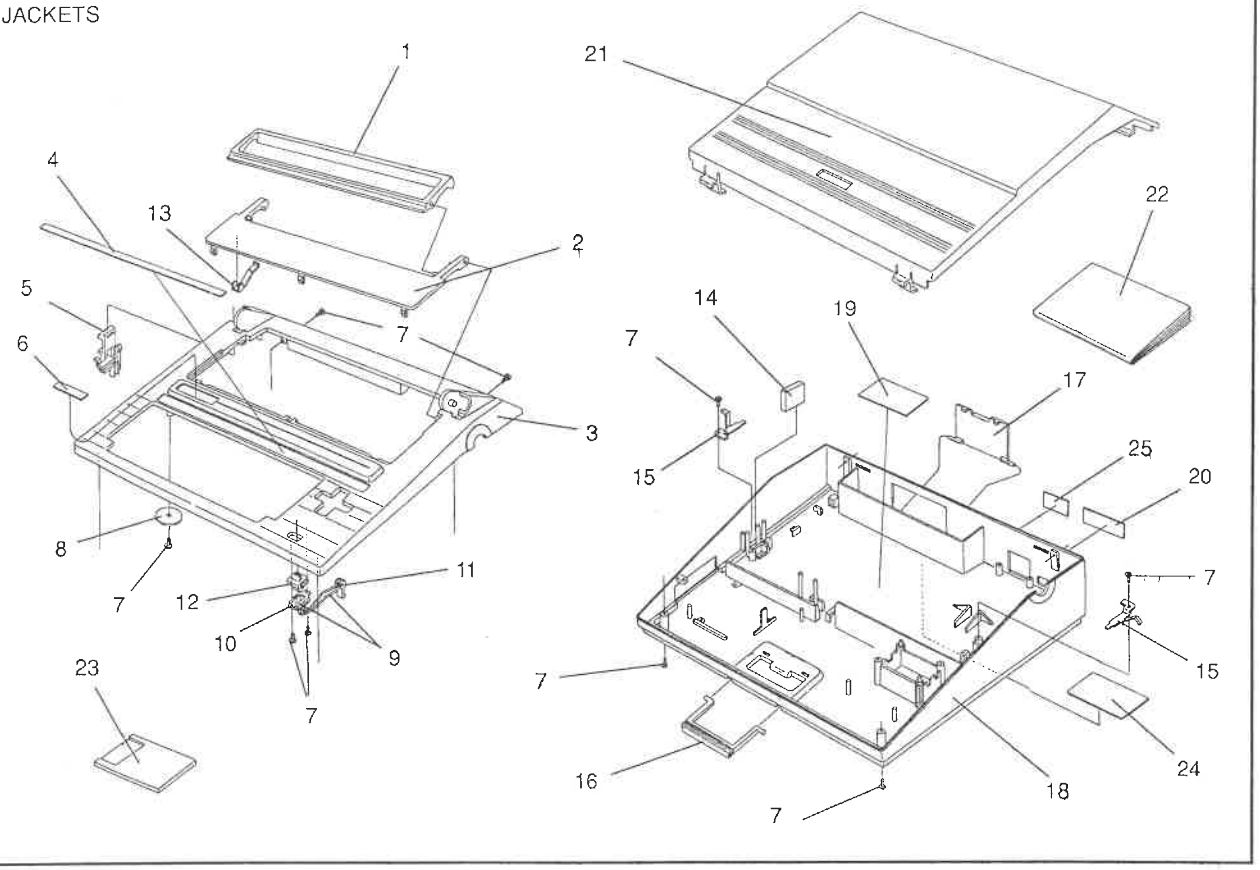
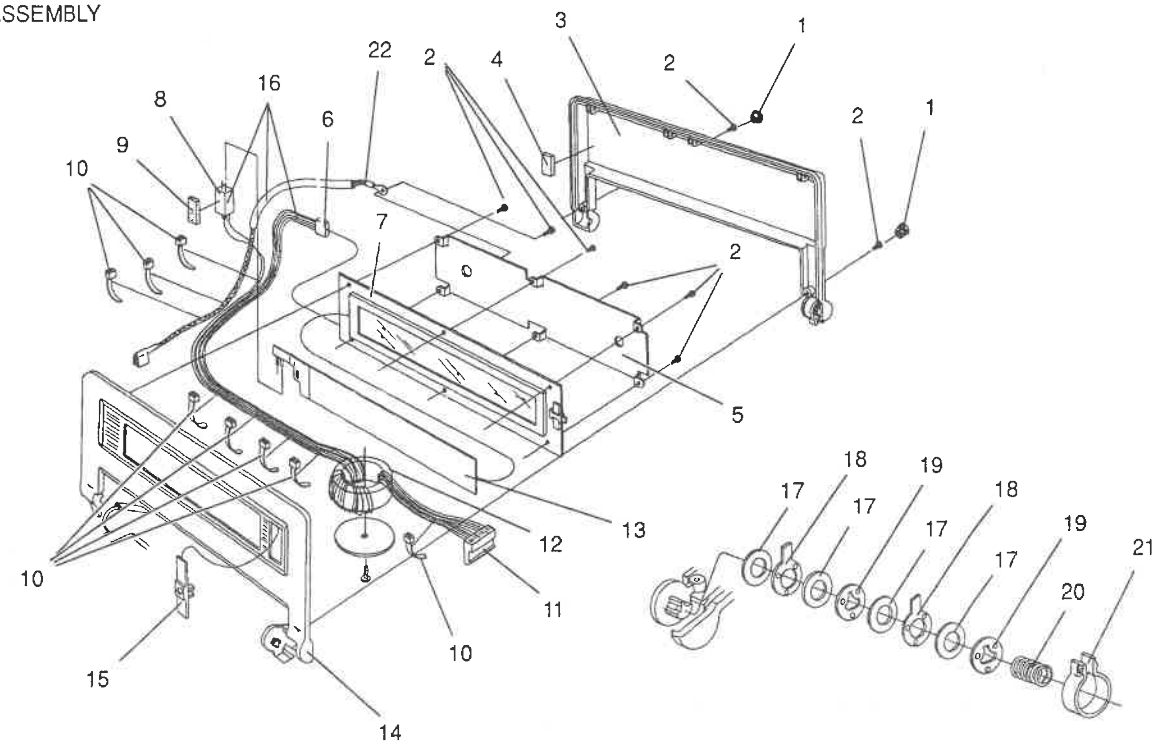
JACKETS



REF	PART NUMBER	PART NAME	QTY
1	768320	Paper Bail, Black	1
1	768321	Paper Bail, Platinum	1
2	768050	Deck, Silver Fog	1
2	768051	Deck, Platinum	1
3	768175	Mask, Platinum, PWP 2000 *	1
3	768176	Mask, Silver Fog, PWP 3 *	1
3	768177	Mask, Silver Fog, Mark X PWP *	1
3	768178	Mask, Silver Fog, Deville PWP 3 *	1
3	768180	Mask, Silver Fog, PWP X15 *	1
3	768181	Mask, Platinum, PWP 55D *	1
	* (w/Ref 4 & Ref 6)		
4	768535	Overlay, Platinum	1
4	768536	Overlay, Silver Fog	1
5	768130	Paper Release Slider, Platinum	1
5	768131	Paper Release Slider, Silver Fog	1
6	729572	Nameplate	1
7	747258	Screw	9
8	768300	Washer	1
9	765891	Mode Switch Assy (w/Ref 10 & 11)	1
10	768107	Mode Switch	1
11	736900	Connector, 2 Pin	1
12	765131	Mode Switch Cap	1
13	771910	Paper Bail Detent	1
14	781890	Casing Base Foam	1
15	770829	Foot Retainer	2
16	768150	Carrying Case Handle, Silver Fog	1
16	768151	Carrying Case Handle, Platinum	1
17	765160	Cord Storage Door, Platinum	1
17	765161	Cord Storage Door, Silver Fog	1
18	76?610	Casing Base, Silver Fog	1
18	768611	Casing Base, Platinum	1
19	772700	Warning Label	1

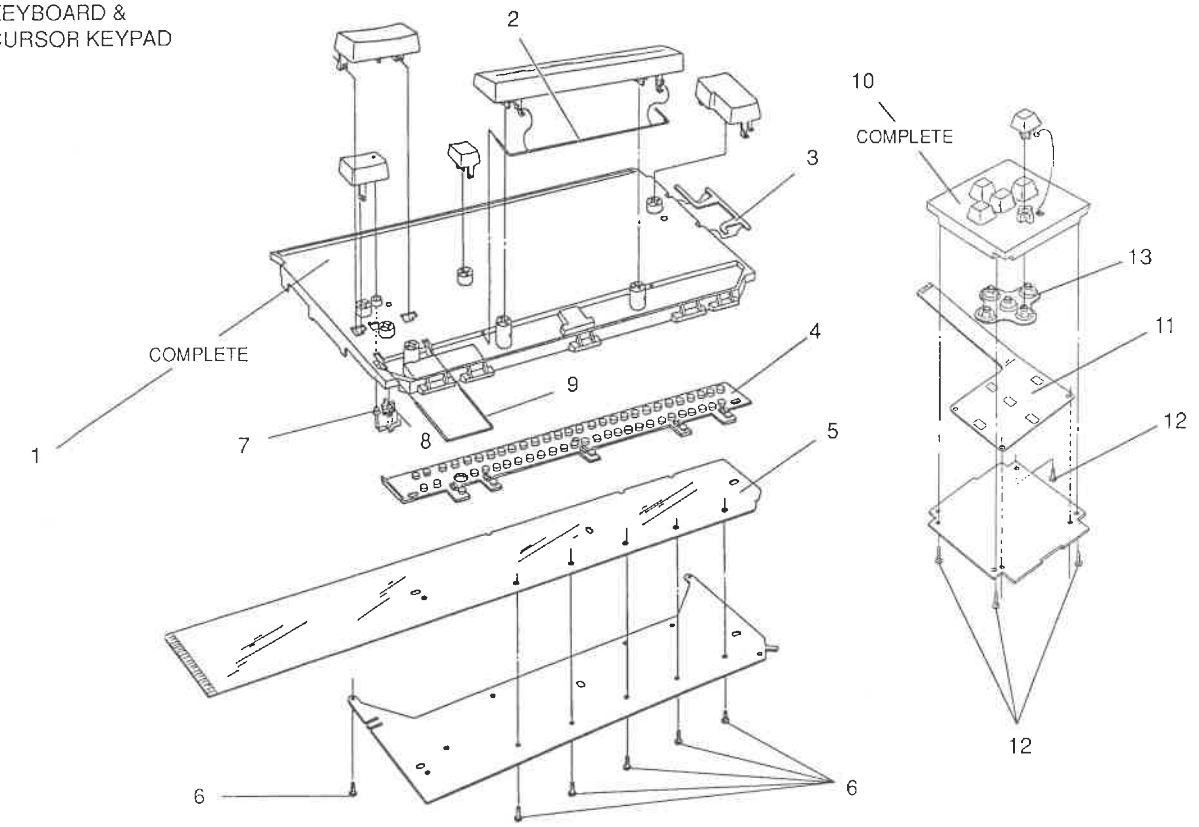
REF	PART NUMBER	PART NAME	QTY
20	768109	Fuse Rating Label	1
21	768090	Carrying Case Lid, Silver Fog	1
21	768091	Carrying Case Lid, Platinum	1
		Owner's Manuals	
22	783619	USA & Canada	1
22	783620	French Canadian	1
22	783621	Spanish American	1
22	783622	United Kingdom, Australia	1
		Tutorial Data Disks	
23	768690	PWP 2000, USA & Canada	1
23	768691	PWP 3, Mark X, Deville PWP 3, PWP X15, PWP 55D, USA & Canada	1
23	768692	PWP 2000, French Canadian	1
23	768693	PWP 3, French Canadian	1
23	768694	PWP 2000, United Kingdom, Australia	1
23	768695	PWP 2000, Spanish American	1
		For International Models Only	
18	768610	Casing Base, Silver Fog, Fr/Can	1
18	768611	Casing Base, Platinum, Fr/Can, Sp/Am	1
18	768612	Casing Base, Platinum, UK	1
19	772700	Warning Label, UK, Australia	1
19	772703	Warning Label, Fr/Can, Span/Am	1
24	770759	Electric Rating Label, UK	1
25	771425	Country of Origin Label, UK	1

LCD ASSEMBLY



REF	PART NUMBER	PART NAME	QTY
1	765110	Hole Cover, Platinum	1
1	765111	Hole Cover, Silver Fog	1
2	770672	Screw	8
3	768340	Upper LCD Housing, Silver Fog	1
3	768341	Upper LCD Housing, Platinum	1
4	781373	Foam	1
5	768105	LCD Ground Shield	1
6	760804	Connector, 10 Pin	1
7	768370	LCD	1
8	761092	DC/AC Inverter	1
9	768640	Foam	1
10	700523	Cable Tie	8
11	700774	Connector, 12 Pin	1
12	760883	Toroid	1
13	761051	EL Panel	1
14	768064	Lower LCD Housing, Silver Fog	1
14	768065	Lower LCD Housing, Platinum	1
15	768190	LCD Switch Slide, Silver Fog	1
15	768191	LCD Switch Slide, Platinum	1
16	768232	LCD Cable/Inverter Assembly, (w/Ref 6, 8-11, 22)	1
17	768309	Friction Brake Pad	4
18	768004	Friction Plate	2
19	768305	Friction Disc	2
20	768007	Brake Spring	1
21	768142	Slip Ring, Silver Fog	1
21	768143	Slip Ring, Platinum	1
22	760910	Ground Cable	1

KEYBOARD &
CURSOR KEYPAD



REF	PART NUMBER	PART NAME	QTY
1	778858	Keyboard Complete, Platinum, USA & Canada	1
2	778281	Spacebar Bail	1
3	778280	Return Bail	1
4	778804	Molded Switches	1
5	778805	Flexible Circuit	1
6	778807	Self Tap Screw	12
7	778317	LED	1
8	778347	LED Contact Washer	1
9	778282	Left Shift Bail	1
10	779221	Cursor Keypad Complete	1
11	779094	Cursor Keypad Mylar PC Board	1
12	778807	Self Tap Screw	4
13	779092	Molded Switches	1

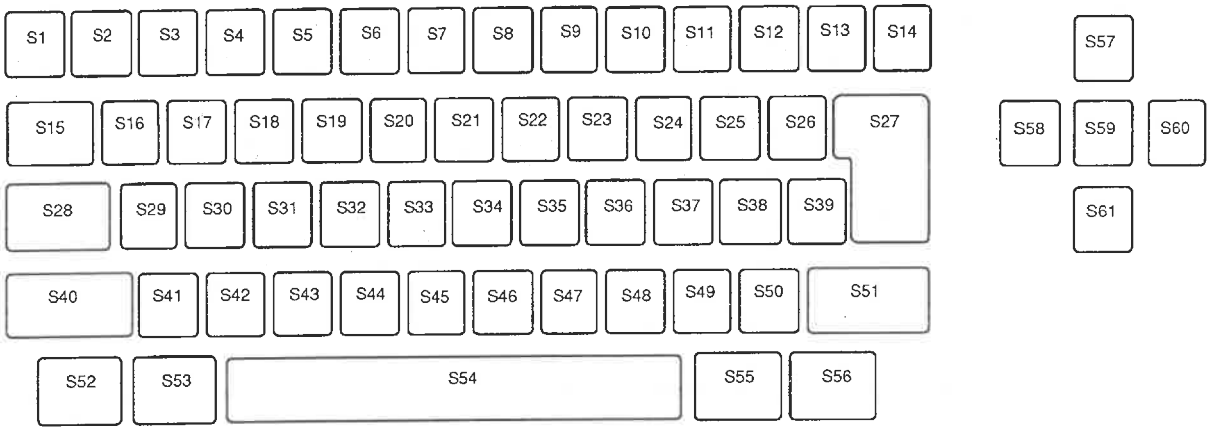
Keyboards for International Models Only

1	778859	Keyboard Complete, Platinum, French Canadian	1
1	778860	Keyboard Complete, Platinum, Spanish American	1
1	778861	Keyboard Complete, Platinum, United Kingdom	1

KEYBUTTON
REFERENCE
CHART

KEYBOARD CODES :

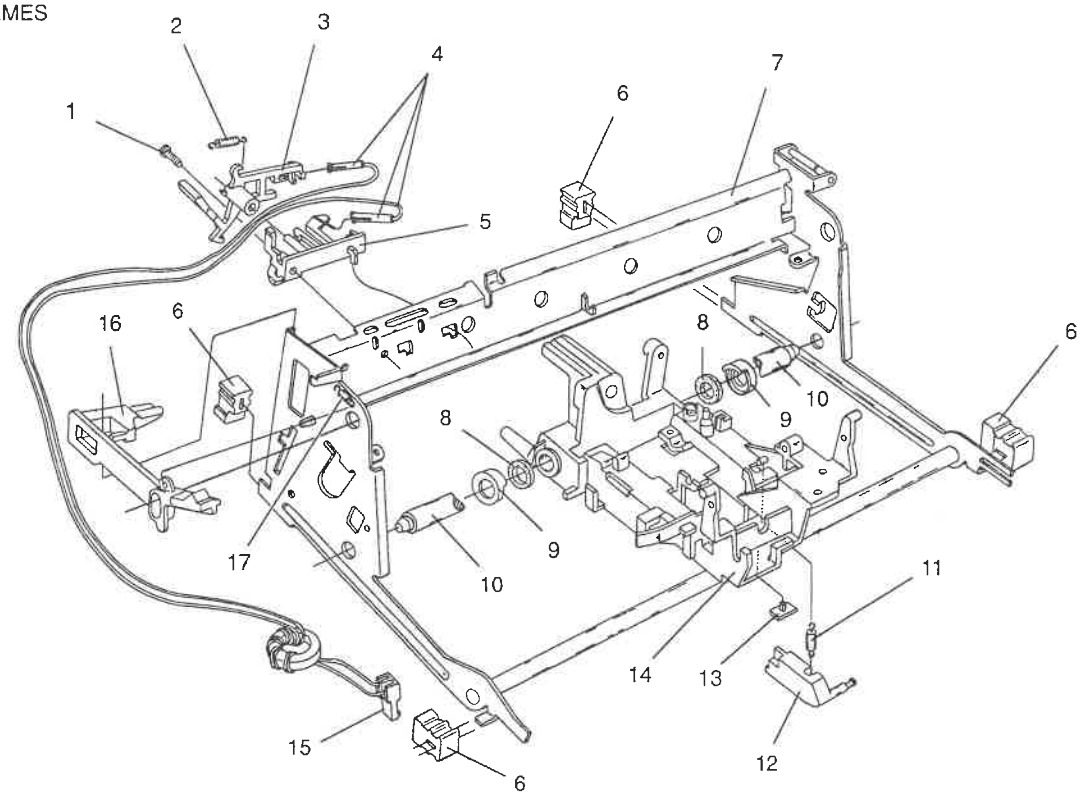
UNITED STATES	----	1063
ENGLISH CANADA	----	1063
FRENCH CANADA	----	1132
UNTIED KINGDOM	----	5108
SPANISH AMERICA	----	1492



S=SWITCH

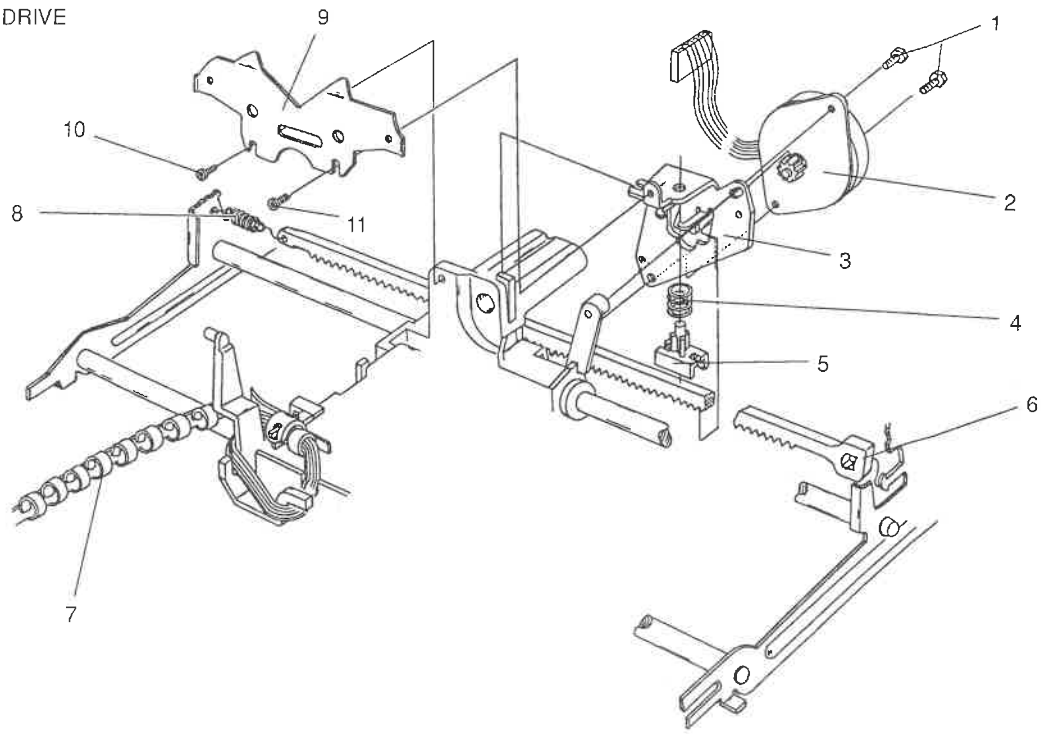
REF	PART NUMBER	ITEM
1	778576	Tab Set
2	778577	1 US, EC
3	778578	2 US, EC
4	778579	3 US, EC
5	778580	4 US, EC
6	778581	5 US, EC
7	778582	6 US, EC
8	778407	& / 7 US, EC
9	778408	* / 8 US, EC
10	778409	(/ 9 US, EC
11	778410	) / 0 US, EC
12	778411	_ / -
13	778412	+ / =
14	778413	Backspace
15	778722	Tab/Clear
16	778592	Q
17	778596	W
18	778597	E
19	778598	R
20	778599	T
21	778600	Y
22	778601	U
23	778468	I
24	778423	O
25	778424	P
26	778649	¼ / ½ / § US, EC, FC
27	778650	Return/Relocate
28	778427	Lock
29	778428	A
30	778686	S / Stop
31	778687	D / Dictionary
32	778688	F / Find
33	778432	G
34	778433	H
35	778434	J
36	778689	K / KB II
37	778690	L / List
38	778437	: / ; US, EC, FC, UK
39	778651	" / ' / ¶ US, EC
40	778691	Shift / Paper In
41	778440	Z
42	778441	X
43	778442	C
44	778723	V / View
45	778693	B / Bold
46	778445	N
47	778446	M
48	778447	, / , US, EC, UK
49	778728	. / . / [US, EC, FC
50	778724	? -- / --] US, EC, UK
51	778450	Shift, Right
52	778652	Code
53	778653	Margin, L/R
54	778654	Spacebar/Halfspace
55	778454	Worderaser US, EC, FC
56	778455	Correct
57	778717	↑ Super
58	778718	← Scrn
59	778726	Adv
60	778719	→ Scrn
61	778727	↓ Sub
		Unique International
2	778602	1 FC
2	778608	1 SA
2	778615	1 UK
3	778603	2 FC
3	778609	2 SA
3	778616	2 UK
4	778604	3 FC
4	778617	3 UK
4	778610	3 SA
5	778605	4 FC
5	778611	4 SA
5	778618	4 UK
6	778606	5 FC
6	778612	5 SA
6	778619	5 UK
7	778700	6 FC
7	778613	6 SA
7	778620	6 UK
8	778694	7 FC
8	778699	7 SA
8	778407	7 UK
9	778695	8 FC
9	778460	8 SA
9	778408	8 UK
10	778696	9 FC
10	778409	9 SA, UK
11	778410	0 FC, SA, UK
26	778670	¨ / ' over / SA
26	778678	¼ / ½ / ⅓ UK
38	778480	Ñ SA
39	778662	^/ ` / ¶ FC
39	778671	: / ; / ¡ SA
39	778679	" / ' / ¾ UK
48	778470	? / , FC
48	778482	° / , SA
50	778725	Ç / é /] FC
50	778483	? over ¿ SA
55	778716	Worderaser/Line Eraser SA,UK

CARRIER MOLDING,
RAILS & FRAMES



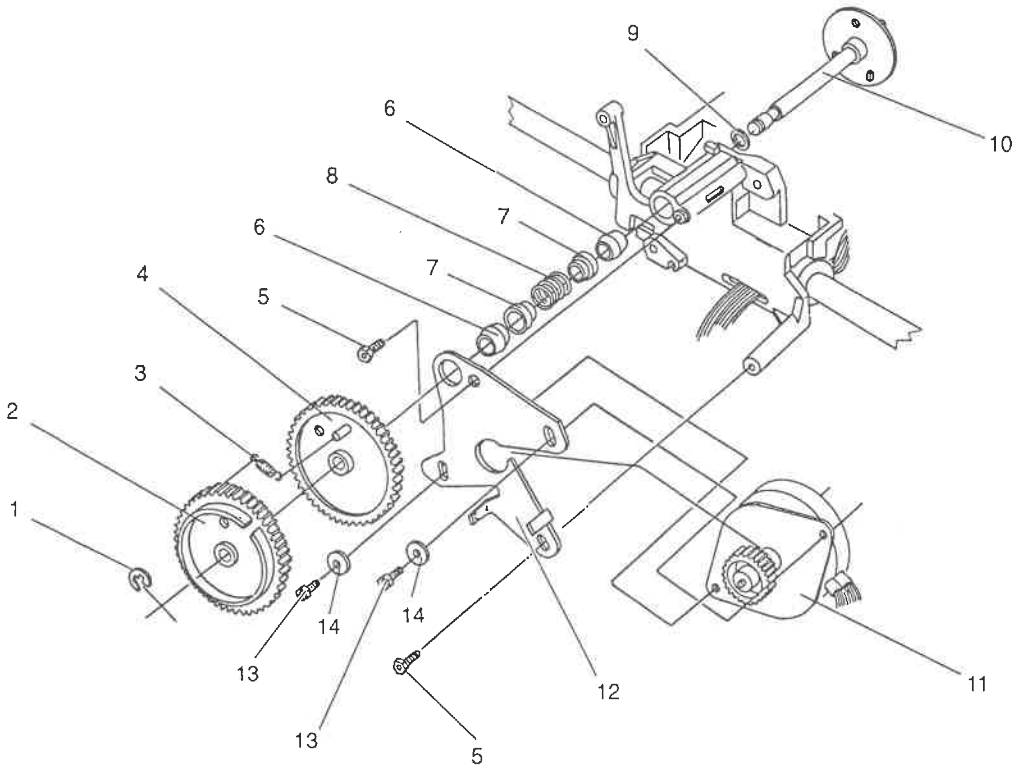
REF	PART NUMBER	PART NAME	QTY
1	783194	Self Tap Screw	1
2	133250	Spring	1
3	783190	Left End Switch Latch	1
4	783832	Left End Switch Assembly (w/Ref 15)	1
5	783191	Left End Switch Bracket	1
6	770435	Foot	4
7	768592	Frame Assembly Complete	1
8	740084	Wiper	2
9	740257	Wiper Retainer	2
10	771427	Rear Carrier Shaft	1
11	771617	Spring	1
12	773046	Carrier Restraint	1
13	780411	Slider	1
14	771956	Molded Carrier (w/Ref 13)	1
15	751057	Connector, 2 Pin	1
16	768530	Actuator	1
17	771271	Spring	1

CARRIER DRIVE



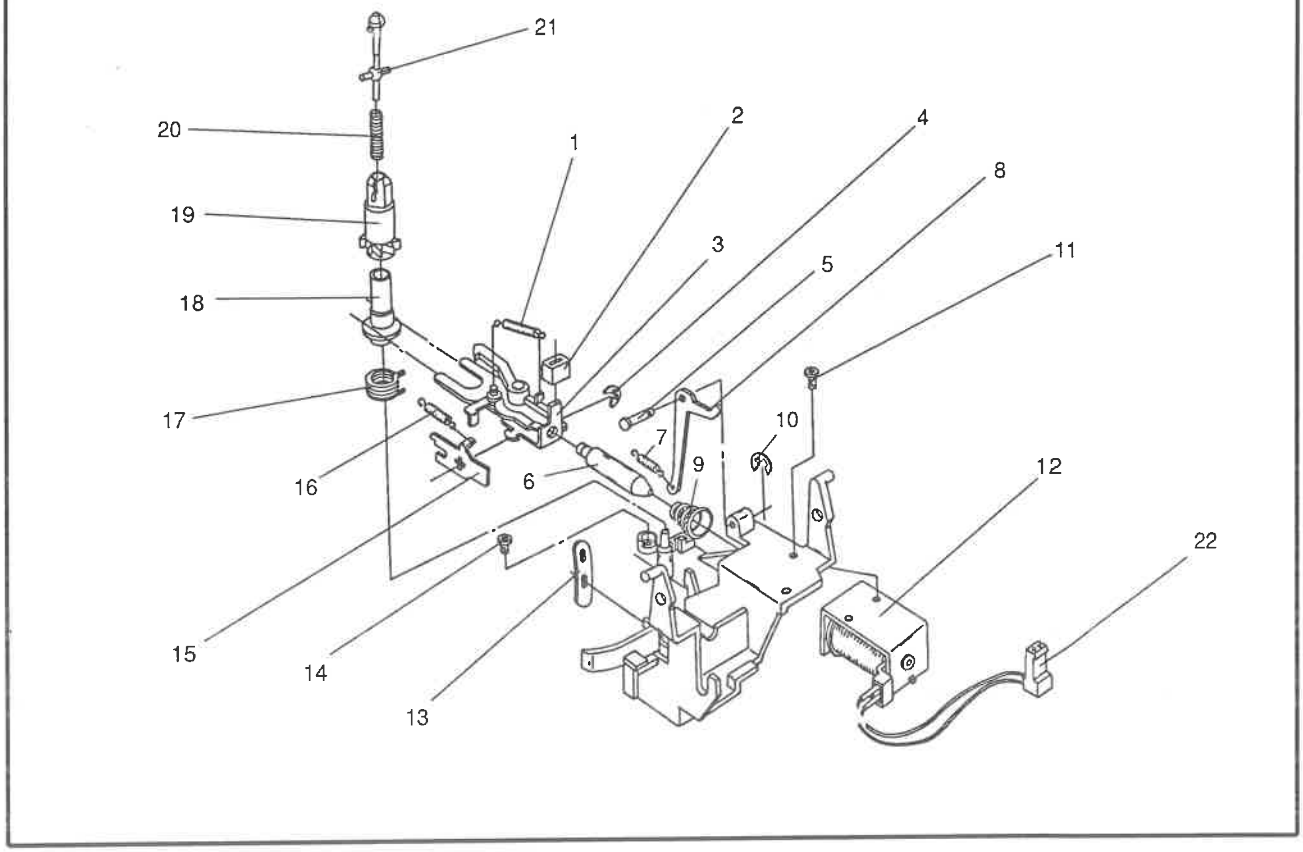
REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	747258	Carrier Motor Screw	2	7	770317	Wire Binder Retainer	1
2	770173	Carrier Motor Assembly	1	8	768661	Spring	1
3	768662	Carrier Return Bracket	1	9	771911	Line Indicator	1
4	751719	Spring	1	10	770672	Self Tap Screw	2
5	768671	Anti-Backlash Slider	1	11	781910	Screw	1
6	768669	Carrier Drive Rack	1				

ELEMENT DRIVE



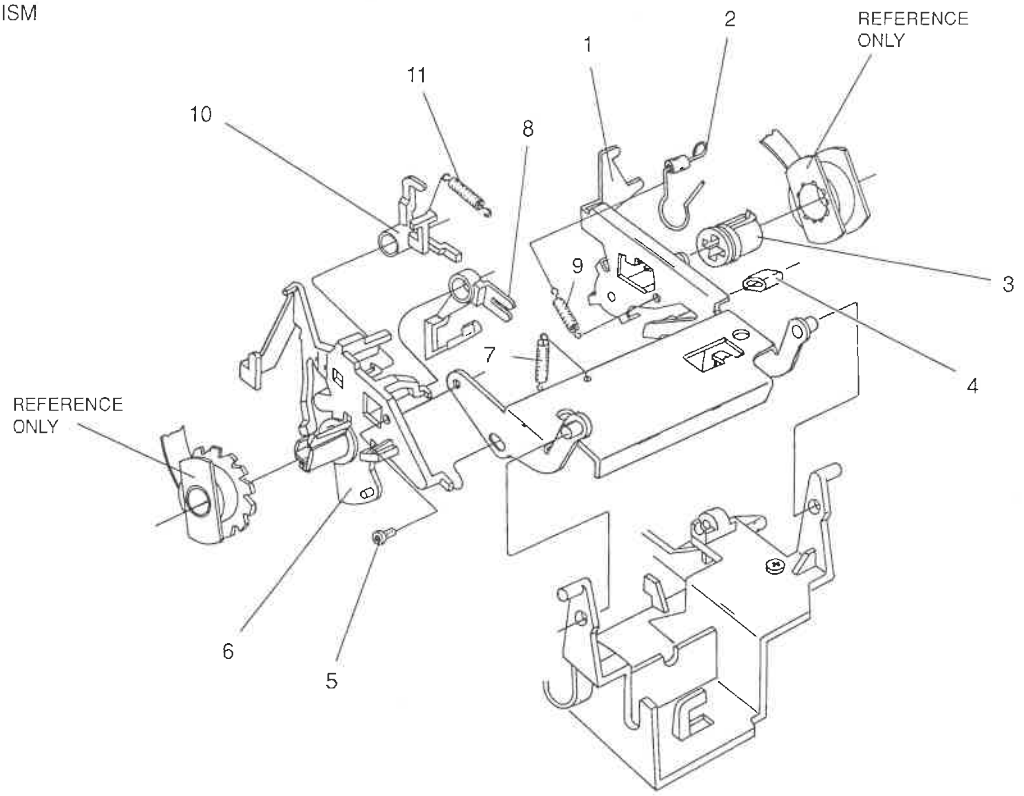
REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	467980	E-Ring	1	8	782619	Spring	1
2	749965	Outside Scissor Gear	1	9	752735	Thrust Washer	1
3	771260	Element Gear Spring	1	10	740004	Element Drive Shaft	1
4	745321	Inside Scissor Gear	1	11	770176	Element Motor	1
5	747258	Self Tap Screw	2	12	783193	Element Motor Plate	1
6	740143	Bearing	2	13	770297	Screw	2
7	752734	Bearing Retainer	2	14	105090	Flat Washer	2

RIBBON DRIVE



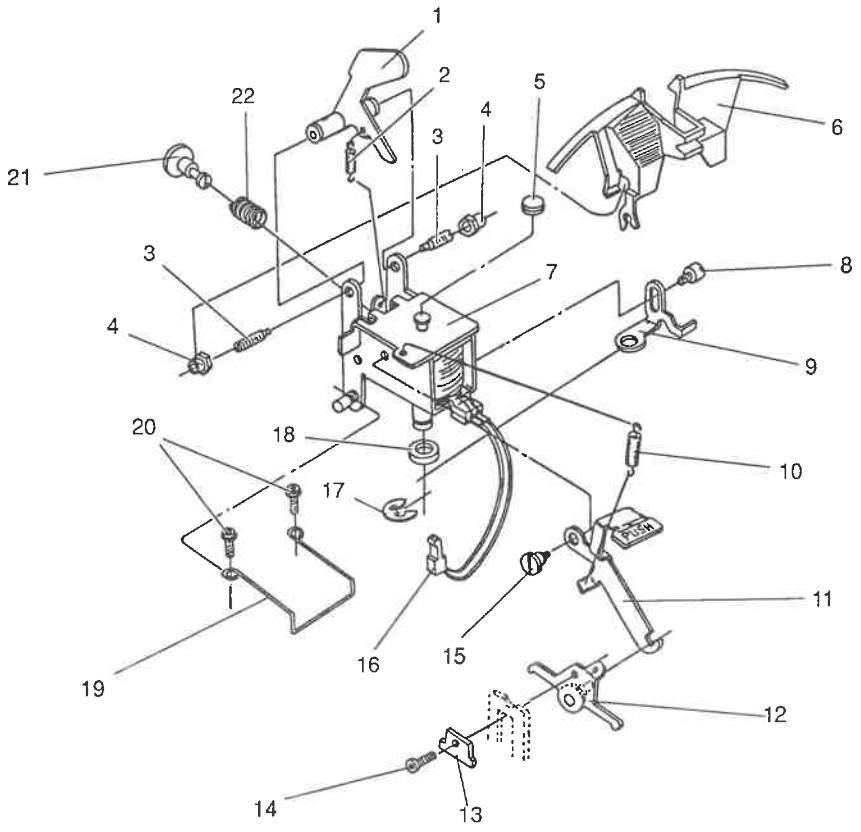
REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	740111	Spring	1	12	782122	Ribbon Drive Solenoid (w/Ref 22)	1
2	781725	Bumper	1	13	770298	Wire Strap	1
3	770290	Ribbon Feed Assembly	1	14	747258	Self Tap Screw	1
4	467980	E-Ring	1	15	770285	Cassette Feed Pawl Latch	1
5	770295	Correction Stud	1	16	771464	Spring	1
6	771411	Ribbon Feed Plunger	1	17	770833	Anti-Backup Spring	1
7	428090	Spring	1	18	770161	Ribbon Feed Shaft	1
8	770294	Correction Lift Bellcrank	1	19	770164	Ribbon Drive Ratchet	1
9	770277	Plunger Spring	1	20	749841	Spring	1
10	102271	E-Ring	1	21	770292	Ribbon Driver	1
11	773340	Self Tap Screw	1	22	751057	Connector, 2 Pin	1

RIBBON CASSETTE & CORRECTION RIBBON MECHANISM



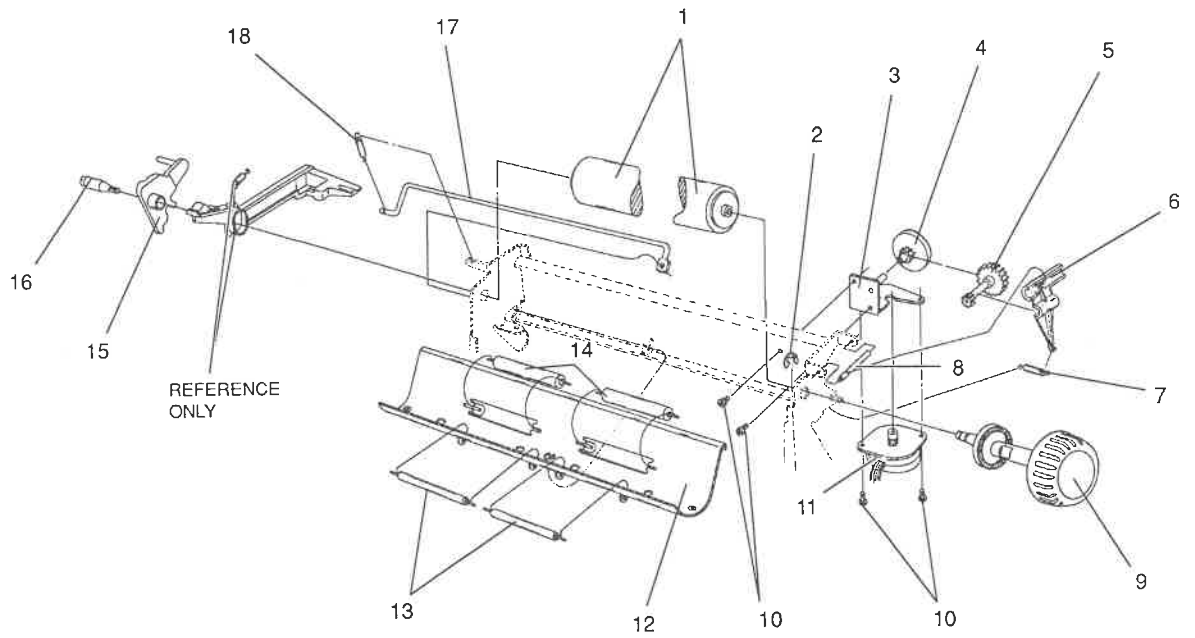
REF	PART NUMBER	PART NAME	QTY	REF	PART NUMBER	PART NAME	QTY
1	766362	Correction Bail Assembly	1	7	770686	Spring	1
2	771502	Correction Brake Spring	1	8	770288	Correction Feed Pawl	1
3	740108	Correction Spool Hub	1	9	428090	Spring	1
4	749494	Vinyl Tubing	1	10	770291	Cassette Latch	1
5	771466	Screw	1	11	740111	Spring	1
6	770293	Left Correction Arm	1				

HAMMER



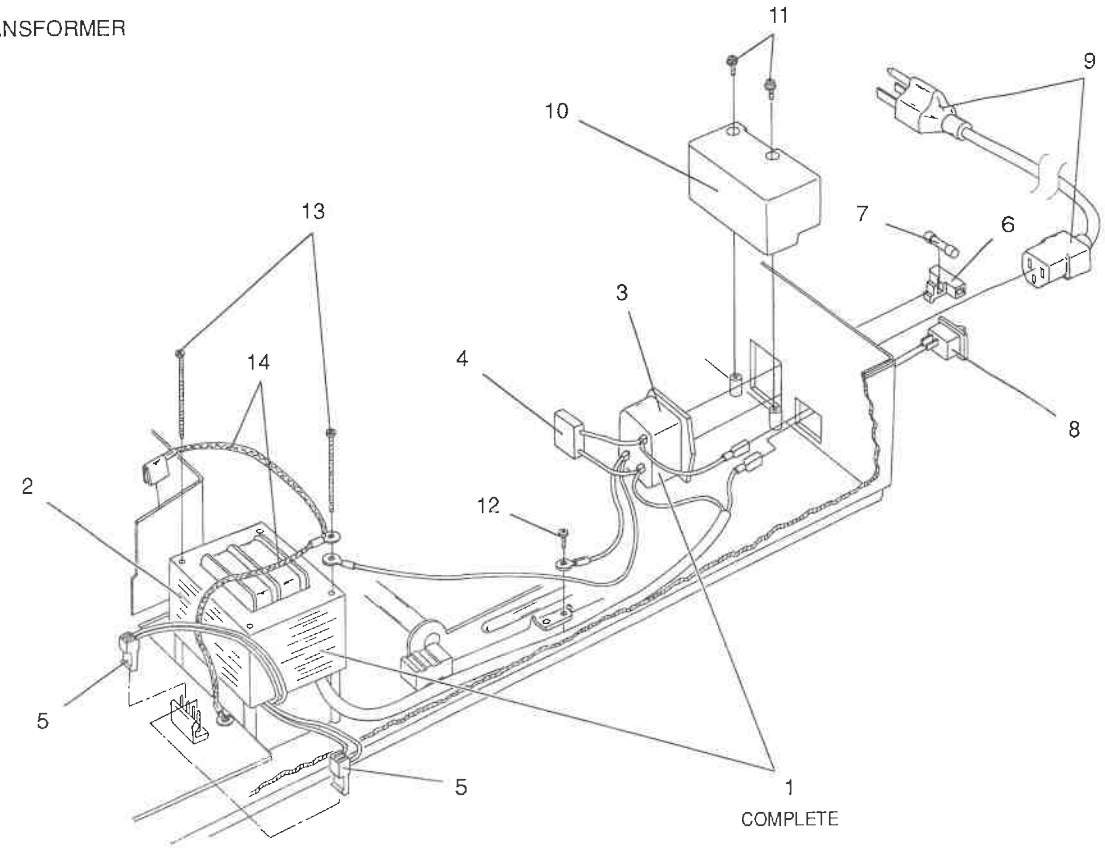
REF	PART NUMBER	PART NAME	QTY
1	752637	Hammer	1
2	771795	Hammer Spring	1
3	771794	Pivot Screw	2
4	770296	Pivot Nut	2
5	772020	Plunger Cap	1
6	771836	Ribbon Guide	1
7	771827	Hammer Solenoid Complete, (w/Ref 16)	1
8	772920	Screw	1
9	770162	Latch Trip	1
10	771419	Spring	1
11	773049	Hammer Latch Lever	1
12	770432	Hammer Plate	1
13	770280	Washer	1
14	770297	Screw	1
15	771469	Screw	1
16	751057	Connector, 2 Pin	1
17	771463	E-Ring	1
18	748562	O-Ring	1
19	749789	Hammer Solenoid Retainer	1
20	747258	Self Tap Screw	2
21	749735	Printwheel Pusher	1
22	749734	Pusher Spring	1

PAPER FEED



REF	PART NUMBER	PART NAME	QTY
1	752559	Platen Assembly	1
2	771930	E-Ring	1
3	771468	Linespace Bracket	1
4	770165	Pinion Face Gear	1
5	750056	Linespace Pinion	1
6	771462	Linespace Pinion Pivot	1
7	770199	Linespace Pinion Spring	1
8	771460	Pinion Carrier	1
9	768121	Platen Knob, Black (5DCB, 5DSA, 5DWA, 5DKA, 5DGA)	1
9	768120	Platen Knob, Platinum (5DEB, 5DDA)	1
10	771466	Self Tap Screw	4
11	770180	Linespace Motor Assembly	1
12	753588	Paper Table, Black	1
13	771611	Paper Feed Roller, Front	2
14	771610	Paper Feed Roller, Rear	2
15	768108	Paper Release Lever	1
16	768005	Left Platen Shaft	1
17	753580	Paper Release Shaft	1
18	751437	Paper Release Spring	1

TRANSFORMER

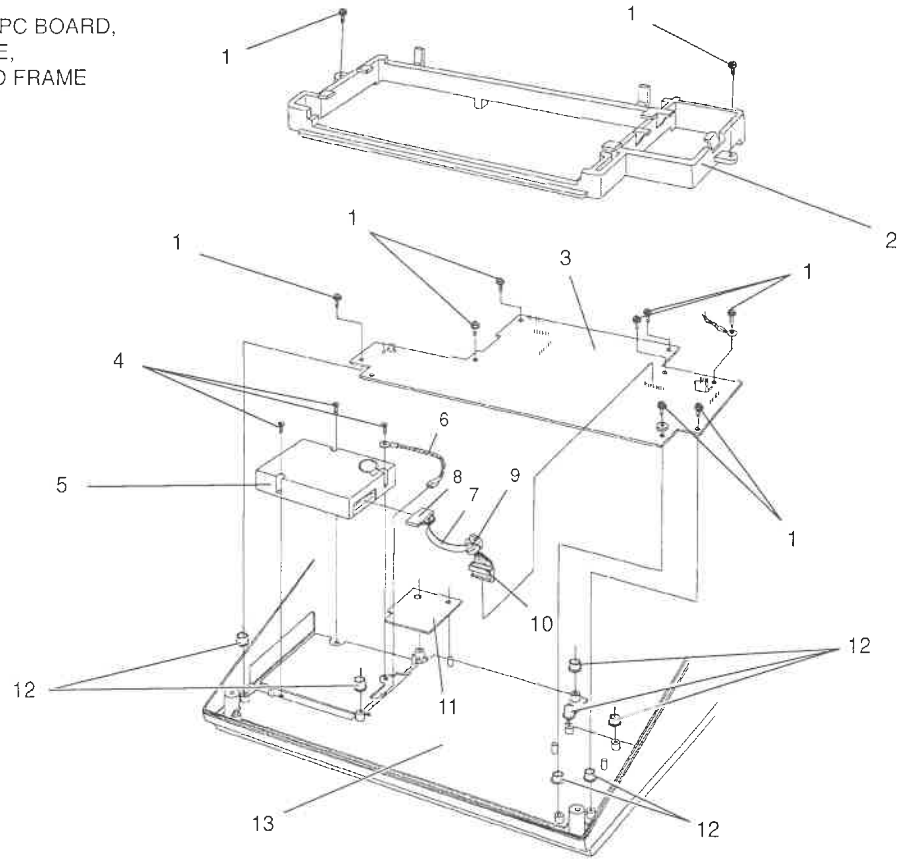


REF	PART NUMBER	PART NAME	QTY
1	768242	AC Power Assembly, 120 V/60 Hz, (w/Ref 2-5)	1
2	768800	Transformer, 120 V/60 Hz	1
3	746035	Appliance Coupler	1
4	746100	Capacitor, 1 uF, 250 VAC	1
5	723356	Connector, 2 Pin	2
6	782215	Fuse Holder	1
7	740437	Fuse, .75 Amp, Slo-Blo, 250V	1
8	718180	Switch	1
9	525778	Power Cord	1
10	768102	Power Supply Cover	1
11	747258	Self Tap Screw	2
12	781557	Screw	1
13	782219	Screw	2
14	782414	Braided Ground Cable	1

For International Models Only
(These parts available for sale only to International Distributors)

1	768243	AC Power Assembly, 240 V/50 Hz (w/Ref 2-5)	1
2	768801	Transformer, 240 V/50 Hz	1
9	522551	Power Cord, United Kingdom	1

CONTROL PC BOARD,
DISK DRIVE,
KEYBOARD FRAME



REF	PART NUMBER	PART NAME	QTY
1	747258	Self Tap Screw	10
2	768000	Keyboard Frame	1
3	768840	Control PC Board, USA & Canada (5DCB, 5DDA, 5DSA, 5DWA, 5DKA)	1
3	768841	Control PC Board, USA & Canada (5DEB)	1
4	765120	Screw	3
5	760768	Disk Drive	1
6	760909	Ground Cable	1
7	768303	Disk Drive Cable Assembly, (w/Ref 8-10)	1
8	760802	Connector, 12 Position	1
9	782289	Toroid	1
10	751064	Connector, 12 Position	1
11	768301	Insulator	1
12	768104	Standoff	7
13	768106	Casing Base Shield	1

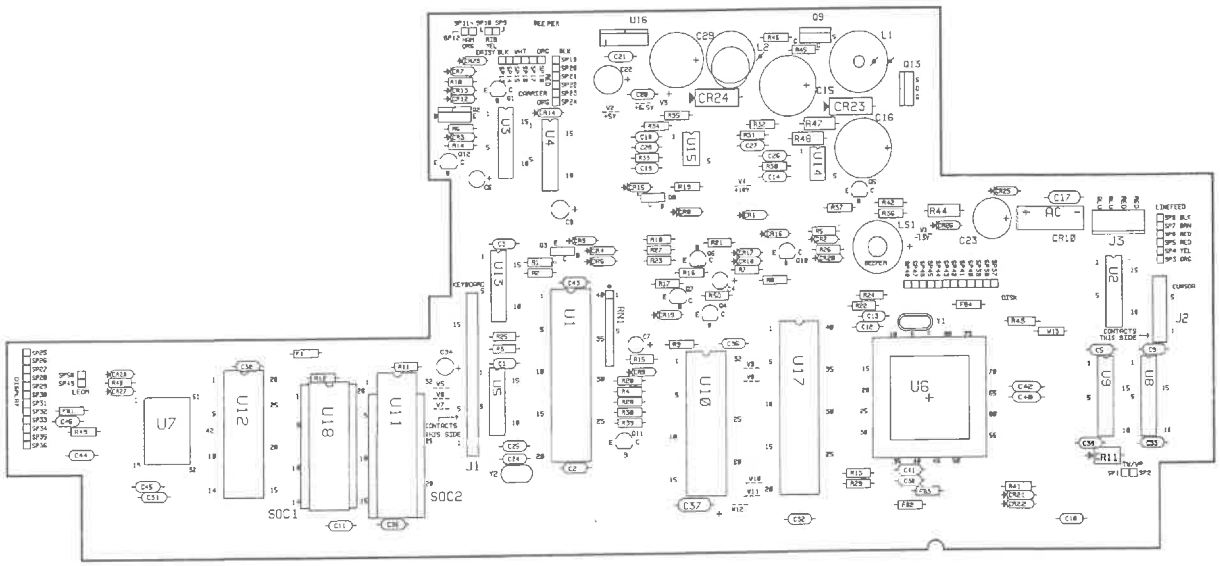
For International Models Only

3	768842	Control PC Board, French Canadian (5DCB, 5DEB)	1
3	768844	Control PC Board, Spanish American (5DEB)	1
3	768845	Control PC Board, United Kingdom (5DEB)	1

CONTROL PC BOARD COMPONENTS

MODELS 5DEB, 5DCB, 5DWA,
5DKA, 5DDA, 5DSA

P/N 768840 USA/ENG. CAN. (ALL MODELS EXCEPT 5DEB)
768841 USA/ENG. CAN. (5DEB ONLY)
768842 FR. CAN. (5DCB)
768844 SP. AMER. (5DEB)
768845 UK (5DEB)

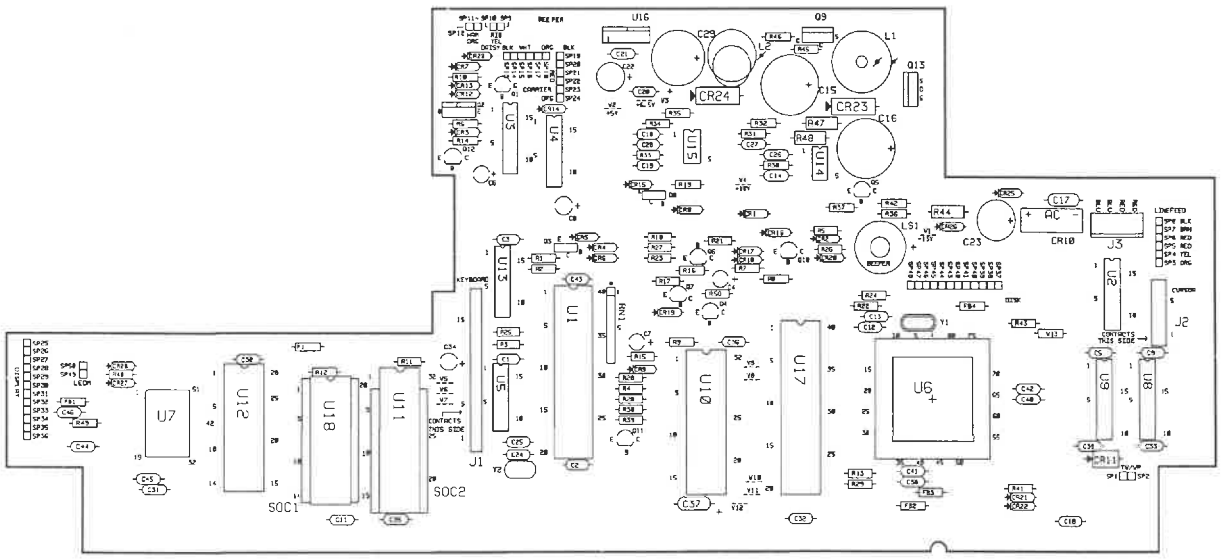


COMPONENT	PART NUMBER	DESCRIPTION
C1, C5, C9, C10, C41-C43, C45, C46	700341	Capacitor, Axial Ceramic, .01 uF, 50V
C2, C3, C11, C21, C30-C32, C35, C36, C38, C40, C44	741566	Capacitor, Axial Ceramic, .1 uF, 50V
C4	736101	Capacitor, Radial Elec., 47 uF, 25V
C6	736102	Capacitor, Radial Elec., 10 uF, 25V
C7, C34	736100	Capacitor, Radial Elec., 10 uF, 10V
C12, C13	700353	Capacitor, Axial Ceramic, 10 pF, 100V
C14, C19	741572	Capacitor, Axial Ceramic, 1800 pF, 100V
C15	730022	Capacitor, Radial Elec., 3300 uF, 25V
C16	770218	Capacitor, Radial Elec., 2200 uF, 50V
C17	741558	Capacitor, Axial Ceramic, .1 uF, 100V
C18, C27	700360	Capacitor, Axial Ceramic, 20 pF, 100V
C20	724673	Capacitor, Axial Tantalum, 1 uF, 35V
C22	736105	Capacitor, Radial Elec., 470 uF, 6.3V
C23	730030	Capacitor, Radial Elec., 470 uF, 35V
C24, C25	700365	Capacitor, Axial Ceramic, 30 pF, 100V
C26, C28	700356	Capacitor, Axial Ceramic, 2000 pF, 50V
C29	730029	Capacitor, Radial Elec., 4700 uF, 10V
C33, C39	741570	Capacitor, Axial Ceramic, 33 uF, 50V
C37	700390	Capacitor, Axial Tantalum, 10 uF, 10V
CR1, CR15	700521	Diode, Silicon, 50V, 1N4001
CR2, CR6, CR9, CR12, CR13, CR17-19, CR21, CR22, CR27, CR28,	709100	Diode, Silicon Switching, 1N914
CR3	760817	Diode, Zener, 4.3V, 1/2 W, 10%, 1N5991
CR4	781740	Diode, Zener, 5.1V, 1.5 W, 1N5918
CR5, CR7	722058	Diode, Fast Recovery, 1 Amp, 1N4933
CR10	734802	Diode, Bridge, 4 Amp, 100V
CR11	760491	Diode, Transorb, 6.8V, P6KE6.8A
CR14	780280	Diode, Zener, 5V, 1 W, 1N4733
CR23, CR24	760479	Diode, Schottky, 3 Amp, 50V, MBR350
CR25	746184	Diode, Silicon, 100V, 1N4002
CR26	760792	Diode, Zener, 13V, 400mW, 1%, 1N5739D
CR29	765829	Diode, Zener, 2.4V, 1/2 W, 10%, 1N5221A

CONTROL PC BOARD COMPONENTS

MODELS 5DEB, 5DCB, 5DWA,
5DKA, 5DDA, 5DSA

P/N 768840 USA/ENG. CAN. (ALL MODELS EXCEPT 5DEB)
768841 USA/ENG. CAN. (5DEB ONLY)
768842 FR. CAN. (5DCB)
768844 SP. AMER. (5DEB)
768845 UK (5DEB)

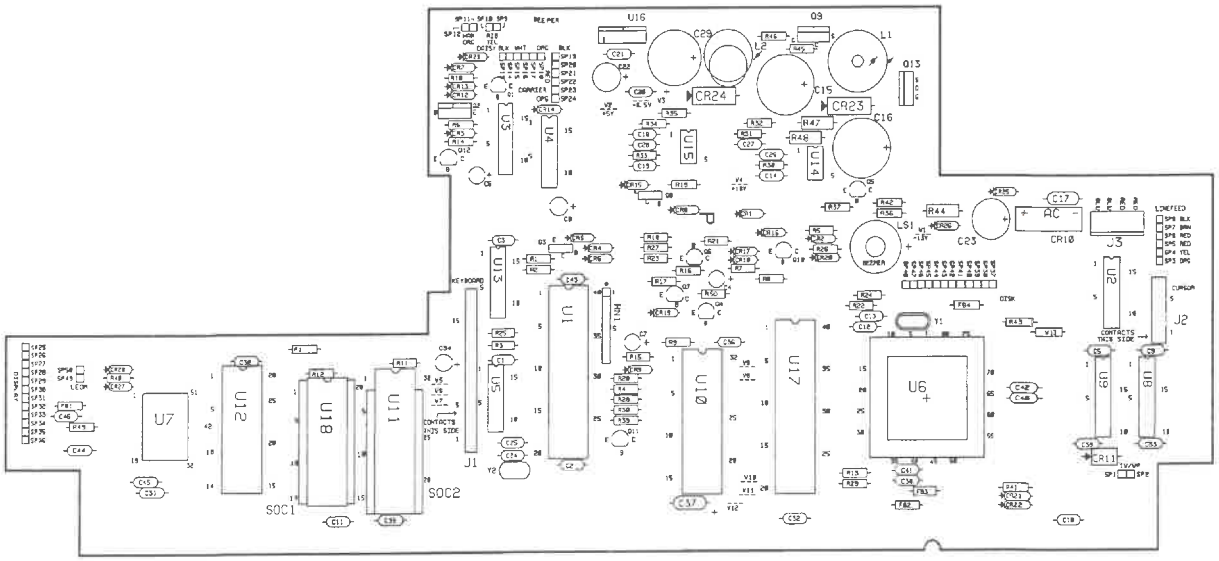


COMPONENT	PART NUMBER	DESCRIPTION
F1	766351	Pico Fuse, .50A, 125 VAC, Slo-Blo
FB1-FB4	765435	Ferrite Bead
J1	770150	Connector, Flex Cable, .100 Centers, 17 Position
J2	770151	Connector, Flex Cable, .100 Centers, 6 Position
J3	723358	Post Header, Locking, .156 Centers, 4 Position
J4	740440	Terminal, Disconnect, .250 TAB
L1	781560	Inductor, 4 Pin, 270 uH, 6 Amp
L2	760416	Inductor, 50 uH, 3.3 Amp
LS1 (Beeper)	728783	Transducer, Audio, 12V
Q1, Q4, Q6, Q7, Q11	702518	Transistor, NPN, TO-92, 2N3904
Q2	770302	Transistor, Darlington, NPN, TO-220, 2N6045
Q3	743086	Transistor, Darlington, NPN, TO-126, 2N6039
Q5, Q12	703714	Transistor, PNP, TO-92, 2N3906
Q8	740344	Transistor, Darlington, PNP, TO-126, 2N6035
Q9, Q13	760812	Power MOSFET, P-Channel, 50V, IRF9Z20
R1, R2	749348	Resistor, 180 Ohms, 1/4 W, 5%
R3, R16, R17, R27, R28, R39-R41	701272	Resistor, 3.9 K Ohms, 1/4 W, 5%
R4, R29	701279	Resistor, 3 K Ohms, 1/4 W, 5%
R5, R45	746938	Resistor, 390 Ohms, 1/4 W, 5%
R6	701268	Resistor, 10 K Ohms, 1/4 W, 5%
R7, R36	701275	Resistor, 22 K Ohms, 1/4 W, 5%
R10	781720	Resistor, 11 Ohms, 1/4 W, 5%, Wire Wound
R13, R20, R49	748225	Resistor, 11 Ohms, 1/4 W, 5%
R14	701267	Resistor, 2.7 K Ohms, 1/4 W, 5%
R15	701299	Resistor, 8.2 K Ohms, 1/4 W, 5%
R18, R19	701280	Resistor, 1.8 K Ohms, 1/4 W, 5%
R30, R33	748227	Resistor, 220 K Ohms, 1/4 W, 5%
R22, R46	701286	Resistor, 820 Ohms, 1/4 W, 5%
R23, R50	701254	Resistor, 1 K Ohm, 1/4 W, 5%
R24	701269	Resistor, 1 Meg Ohm, 1/4 W, 5%
R31, R34	748279	Resistor, 10 K Ohms, 1/4 W, 1%
R32	748285	Resistor, 170 K Ohms, 1/4 W, 1%
R35	748287	Resistor, 56 K Ohms, 1/4 W, 1%
R37	701297	Resistor, 5.6 K Ohms, 1/4 W, 5%

CONTROL PC BOARD COMPONENTS

MODELS 5DEB, 5DCB, 5DWA,
5DKA, 5DDA, 5DSA

P/N 768840 USA/ENG. CAN. (ALL MODELS EXCEPT 5DEB)
768841 USA/ENG. CAN. (5DEB ONLY)
768842 FR. CAN. (5DCB)
768844 SP. AMER. (5DEB)
768845 UK (5DEB)



COMPONENT	PART NUMBER	DESCRIPTION
R38	701289	Resistor, 510 Ohms, 1/4 W, 5%
R42	701266	Resistor, 100 Ohms, 1/4 W, 5%
R44	703722	Resistor, 1 K Ohm, 1/2 W, 5%
R47	765830	Resistor, 390 Ohms, 1/2 W, 5%
R48	765831	Resistor, 820 Ohms, 1/2 W, 5%
RN1	752156	Resistor Network, 22 K Ohms, 5%, 9 Pin Sip
SP1-SP50	748858	Stake Pin, .410 Long X .025 Square
U1	750829	IC, Microprocessor, Slave, 8053 (Programmed)
U2, U3, U4	781722	IC, Quad Driver, L6220
U5	760754	IC, TTL, Dual Decoder/Demultiplexer, 74LS156
U6	761060	IC, ASIC, PWP, 84 Pin, PLCC
U7	761069	IC, LCD Controller
U8, U9	760511	IC, 64 K X 4 Bit D-RAM, 4464
U10	750718	IC, Dictionary, 1 Meg (Programmed), USA & Canada
U11	750969	IC, EPROM, 1 Meg, USA & Canada (5DCB, 5DSB, 5DWB, 5DKB, 5DGB, 5DDA)
U11	750989	IC, EPROM, 1 Meg, USA & Canada (5DEB)
U12	781912	IC, CMOS, 8 K X 8 Bit S-RAM, 6264
U13	770307	IC, Quad Driver, L6221B
U14, U15	770300	IC, Voltage Regulator, LM3578
U16	760799	IC, Regulator, 5V, SI, 3052V
U17	760486	IC, Microprocessor Master, Z80B
W1-W4	705294	Jumper Wire
W13	752314	Resistor, 0 Ohms (5DCB, 5DSB, 5DWB, 5DKB, 5DGB, 5DDA)
Y1	761067	Crystal, Resonant, 16.25 MHz
Y2	736950	Resonator, Ceramic, 12 MHz
International Models Only		
U10	750667	IC, Dictionary, 2 Meg (Programmed) French Canadian
U10	750713	IC, Dictionary, 2 Meg (Programmed) United Kingdom
U10	750719	IC, Dictionary, 2 Meg (Programmed) Spanish American
U11	750990	IC, EPROM, 1 Meg, French Canadian
U11	750992	IC, EPROM, 1 Meg, Spanish American
U11	750724	IC, EPROM, 1 Meg, United Kingdom
U18	750725	IC, EPROM, United Kingdom

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105090	8	736900	2	750829	17	765891	2
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428090	9	740004	8	750989	17	766362	10
428090	10	740084	6	750990	17	768000	14
467980	8	740108	10	750992	17	768004	3
467980	9	740111	9	751057	6	768005	12
522551	13	740111	10	751057	9	768007	3
525778	13	740143	8	751057	11	768050	2
700341	15	740257	6	751064	14	768051	2
700353	15	740344	16	751437	12	768064	3
700356	15	740437	13	751719	7	768065	3
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700365	15	741558	15	752314	17	768091	2
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700521	15	741570	15	752637	11	768104	14
700523	3	741572	15	752734	8	768105	3
700774	3	743086	16	752735	8	768106	14
701254	16	745321	8	753580	12	768107	2
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701267	16	746100	13	760416	16	768109	2
701268	16	746184	15	760479	15	768120	12
701269	16	746938	16	760486	17	768121	12
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701275	16	747258	7	760511	17	768131	2
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701289	17	747258	13	760799	17	768151	2
701297	16	747258	14	760802	14	768175	2
701299	16	748225	16	760804	3	768176	2
702518	16	748227	16	760812	16	768177	2
703714	16	748279	16	760817	15	768178	2
703722	17	748285	16	760883	3	768180	2
705294	17	748287	16	760909	14	768181	2
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768592	6	770302	16	778407	5	778604	5
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768610	2	770317	7	778408	5	778606	5
768611	2	770432	11	778408	5	778608	5
768611	2	770435	6	778409	5	778609	5
768612	2	770672	3	778409	5	778610	5
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768662	7	770759	2	778411	5	778613	5
768669	7	770829	2	778412	5	778615	5
768671	7	770833	9	778413	5	778616	5
768690	2	771260	8	778423	5	778617	5
768691	2	771271	6	778424	5	778618	5
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768693	2	771419	11	778428	5	778620	5
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770199	12	771910	2	778483	5	778694	5
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770277	9	771930	12	778577	5	778696	5
770280	11	771956	6	778578	5	778699	5
770285	9	772020	11	778579	5	778700	5
770288	10	772700	2	778580	5	778716	5
770290	9	772700	2	778581	5	778717	5
770291	10	772703	2	778582	5	778718	5
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770293	10	773046	6	778596	5	778722	5
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770295	9	773340	9	778598	5	778724	5
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